University of London

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REPORTS

FROM

COMMITTEES:

EIGHT VOLUMES.

— *(3.)* —

EAST LONDON WATER BILLS, &c.;
FACTORY ACTS EXTENSION AND HOURS OF LABOUR REGULATION BILLS;
LIBEL BILL;
SPECIAL AND COMMON JURIES;
WOODHOUSE COLLECTION.

Session
5 *February* —— 21 *August* 1867.

VOL. IX.

1867.

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REPORT

FROM THE

SELECT COMMITTEE

ON

EAST LONDON WATER BILLS, &c.;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

APPENDIX AND INDEX.

Ordered, by The House of Commons, *to be Printed,*
27 *June* 1867.

Thursday, 21st February 1867.

EAST London Water (Thames Supply) Bill (*by Order*) read a second time, and committed to a Select Committee of 10 Members, of whom five shall be nominated by the Committee of Selection, and five by this House.

Ordered, THAT it be an instruction to the Committee to inquire into the operation and results of " The Metropolis Water Act, 1852."

East London Water (Various Powers) Bill (*by Order*) read a second time, and committed to the Select Committee on the East London Water (Thames Supply) Bill.

Monday, 25th February 1867.

Ordered, THAT the Petitions of the Metropolis Water Companies, praying to be heard by Counsel and witnesses before the Select Committee on the East London Water (Thames Supply) Bill, and the East London Water (Various Powers) Bill, which Committee is directed to inquire into the operation and results of " The Metropolitan Water Act, 1852," be referred to such Committee.

Ordered, THAT it be an instruction to the Committee that the parties be heard upon their Petitions accordingly, if they think fit. Viz. :—

New River Company. (February 22nd.)
Southwark and Vauxhall Water Company. (February 25th.)
Grand Junction Waterworks Company. (February 25th.)
Chelsea Waterworks Company. (February 25th.)
West Middlesex Waterworks Company. (February 28th.)
Lambeth Waterworks Company. (February 28th.)
Board of Works for Plumstead District. (February 8th.)
East London Waterworks Company. (March 7th.)
Kent Waterworks Company. (March 27th.)

Thursday, 28th February 1867.

Ordered, THAT the Petitions praying to be heard by Counsel before the Committee on the operation and results of " The Metropolis Water Act, 1852," from the Lambeth Waterworks Company, and West Middlesex Waterworks Company, be referred to the Committee.—Counsel ordered.

Thursday, 7th March 1867.

Ordered, THAT the Petition of the East London Waterworks Company, praying to be heard by Counsel *in favour* of the Bills, and an inquiry into " The Metropolis Water Act, 1852," be referred to the Committee.—Counsel ordered.

Ordered, THAT all Petitions which have been presented during the present session relating to the matters referred to this Committee, and such of the Petitioners as pray to be heard by themselves, their Counsel, or agents, be heard upon the allegations in their Petitions, if they think fit; and Counsel heard in favour of the Bills.

Ordered, THAT the Committee have power to send for persons, papers, and records.

Friday, 8*th March* 1867.

Ordered, THAT the Petition of the Board of Works for Plumstead District, for securing to that district a continuous supply of water at a low rate of charge, be referred to the Committee.

Friday, 22*nd March* 1867.

Select Committee on the East London Water Bills, &c., nominated:—

Mr. Ayrton. Mr. Sclater-Booth. Mr. Knatchbull-Hugessen.	Colonel Hogg. Mr. Benyon.

Saturday, 23*rd March* 1867.

Committee of Selection.

The following Members are added to the Committee:—

Mr. Henry Baillie (Inverness-shire.) Lord John Hay.	Mr. Headlam. Mr. Kekewich. Mr. Waldegrave-Leslie.

Tuesday, 26*th March* 1867.

Ordered, THAT Five be the quorum of the Committee.

Wednesday, 27*th March* 1867.

Ordered, THAT the Petition of the East Kent Waterworks Company, on the subject of inquiry, be referred to the Committee.

Wednesday, 9*th April* 1867.

Ordered, THAT the Petition of the Metropolitan Board of Works, praying to be heard by Counsel, &c., before the Select Committee upon the inquiry into the operation and results of "The Metropolis Water Act, 1852," be referred to the Select Committee.

Tuesday, 30*th April* 1867.

Ordered, THAT the Petition of the South Essex Waterworks Company, praying to be heard before the Select Committee on the East London Water Bills, &c., with reference to the operation and results of "The Metropolis Water Act, 1852," be referred to the Select Committee.

Friday, 10th May 1867.

Ordered, THAT the Petition of the Trustees of the River Lea, praying to be heard by Counsel, &c., before the Select Committee upon the inquiry into the operation and results of "The Metropolis Water Act, 1852," be referred to the Select Committee.

Tuesday, 14th May 1867.

Ordered, THAT the parties appearing before the Select Committee on the East London Water Bills, &c., have leave to print the Minutes of the Evidence taken before the Committee day by day from the Committee Clerk's copy, if they think fit.

Wednesday, 15th May 1867.

Ordered, THAT Mr. Knatchbull-Hugessen be discharged from further attendance on the Committee, and that Lord Frederick Cavendish be added thereto.

Monday, 27th May 1867.

Ordered, THAT the Minutes of Evidence taken before the Select Committee on the Thames Navigation Bill in the Session of 1866 be referred to the Select Committee.

Thursday, 27th June 1867.

Ordered, THAT the Committee have power to Report their Observations, together with the Minutes of Evidence taken before them, to The House.

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REPORT.

THE SELECT COMMITTEE on East London Water Bills, who were instructed "to inquire into the Operation and Results of the Metropolis Water Act, 1852;"——Have considered the Matters to them referred, and have Agreed to the following REPORT:—

1. Several companies having been established for the purpose of supplying the inhabitants of London with water, they began to enter into a competition with one another to obtain the supply of particular districts by offering low rates, and injuring their own affairs, until at length they entered into a combination to raise their rates. The inhabitants then complained so loudly of the conduct of the companies, that in 1821 a Committee of the House was appointed to inquire into the whole subject of the water supply of the metropolis. This Committee made a very comprehensive Report, expressing without hesitation their opinion that the supply of water to London was very superior to that enjoyed by any other City in Europe, and recommending that an Act should be passed to prescribe the maximum rates to be charged by the companies, and to enforce arrangements to prevent waste of water and other abuses. This Report was followed by an ineffectual attempt at general legislation, after which the subject dropped, owing, no doubt, to the companies having avoided occasioning any new cause of discontent.

2. In 1828 an alarm arose that the water then, with the exception of the New River supply, drawn from the tidal waters of the Thames near London, was so unwholesome as to be dangerous to health. A Royal Commission was in consequence appointed to ascertain the sources and means by which the metropolis was supplied with water, to determine the quality of the water, and to obtain information to suggest, if necessary, new methods or sources of supply; but the Commissioners were afterwards directed not to prosecute the latter inquiry. The Commission reported that the water of the Thames, when free from extraneous substances, was not unfit for domestic purposes or injurious to health; but as it approached the metropolis, it became loaded with a quantity of filth, which rendered it disgusting to the senses, and improper to be employed in the preparation of food, and considered that the supply was susceptible of, and required improvement. That many of the complaints respecting the quality of the water were well founded, and that it ought to be derived from other sources than those then resorted to, and guarded by such restrictions as should at all times ensure its cleanliness and quality.

3. This Report was subsequently referred to a Committee of the House of Commons, which in July 1828 made a Report confirming the views expressed by the Royal Commission, and recommending that Mr. Telford the engineer should be instructed to proceed to the making of such surveys as he might think necessary, in order to enable him to recommend a practicable and efficacious plan of supplying the whole of the metropolis with pure and wholesome water.

4. In 1834, Mr. Telford having been employed by Her Majesty's Government, in accordance with the Committee's recommendation, made a report advising that the northern part of the metropolis then supplied from the Thames should be supplied from the River Verulam, and that the southern part should be supplied from the River Wandle. This report was referred to a Select Committee in 1834, which carried on a prolonged investigation, but in consequence of the lateness of the Session, merely reported the Evidence to the House.

5. The question was afterwards taken up by the House of Lords, who in 1840 appointed a Committee to take into consideration the supply of water to the metropolis, to whom was referred the Report of the Royal Commissioners of 1828; but this Committee also, after examining many witnesses, only concluded with reporting the Evidence to the House.

6. On an outbreak of cholera, attention was again drawn in 1849 to the quality of the water supplied to the metropolis. The Board of Health, which had been recently established, undertook to investigate the subject, and in the following year presented a report which entered very fully into all questions affecting the supply of water to the inhabitants of the metropolis. The Board proposed a new plan for obtaining a better supply by drawing it from gathering grounds in the Bagshot Sands, and in the district known as the Hind head, to the South of Guildford.

7. In the same year a Bill having been introduced, bearing upon the supply of water from the River Lea, the report of the Board of Health underwent a severe scrutiny before a Committee of the House, and its conclusions were somewhat discredited. In consequence of this the Government appointed a scientific Commission on the chemical quality of the waters supplied by the companies, and of those proposed to be supplied instead.

8. The Commission in 1850 came to the conclusion that the water then supplied to the metropolis exhibited no unwholesome qualities, that there were no sufficient grounds for believing that the mineral contents of the water were injurious to health, and that no reasonable doubt could be entertained of its salubrity; they recommended that the water should be protected from town sewage, and be filtered, and they condemned the proposed plan of the Board of Health.

9. Whilst these discussions were going on, the tidal waters of the Thames were being gradually affected by modifications in the drainage of London. It had long been penal to allow any solid matter to pass into the drains, but, with a better supply of water, the idea that all solid matter should be at once washed into the drains prevailed, and was at length made compulsory. By the extension of the population the quantity of house drainage was at the same time largely increased.

10. In 1851 Her Majesty's Government introduced a Bill to amalgamate all the companies then existing for the supply of the metropolis into one company, and to compel the new company to obtain water from such sources as the Secretary of State might direct, and otherwise improve the quality of the water. This Bill was referred to a Committee of the House, presided over by the late Sir James Graham. The subject was fully investigated, and it was ascertained that by proper and suitable arrangements the defects which had been found to exist might be remedied, and that a sufficient supply of water of good quality might be obtained from the Valley of the Thames, and from the other sources from which the companies drew their supplies.

11. Your Committee have thus briefly noticed the Proceedings of the House before the passing of the Act of 1852, to show that the subject had been very fully considered, and that the House was in possession of the most complete information before it adopted the general policy prescribed by that Act.

12. After undergoing some changes and modifications, the companies which had then secured for themselves the supply of water to the metropolis were as follows:—

> The Chelsea Waterworks Company, the West Middlesex Waterworks Company, the Grand Junction Waterworks Company, the Southwark and Vauxhall Waterworks Company, the Lambeth Waterworks Company, all obtaining their supplies from the Thames, and, except the Lambeth Company, from its tidal waters;
>
> The New River Company, drawing its supplies from the Chadwell and Amwell springs, and from the River Lea, near Hertford;

The East London Waterworks Company, drawing its supplies from the River Lea at and below Lea Bridge;

The Hampstead Waterworks Company, drawing its supplies from springs and surface rain water at Hampstead;

The Kent Company, obtaining its supplies from the Ravensbourne river, near Lewisham.

13. The chief provisions of the Metropolis Act of 1852, regulating the sources of supply, may be shortly summed up as follows:—

After the 31st August 1855, the companies were prohibited from taking water at any part of the River Thames below Teddington Lock, or from any tributary stream at any part below the highest point at which the tide flowed. The reservoirs of all the companies within a direct distance of five miles from St. Paul's were to be roofed or covered over, unless the water should be subject to filtration after leaving the reservoir.

All water was to be subject to filtration, unless drawn direct from wells into a covered reservoir for distribution.

14. Considering the impressions which seem to pervade the minds of many persons that the present sources of supply are inadequate for the wants of the metropolis, your Committee have deemed it right to examine how far these provisions of the Act of 1852 have secured a sufficient supply of wholesome water for the metropolis, not only for the present time, but for many years to come.

15. The Lambeth Company had already constructed works for the purpose of obtaining a supply at Thames Ditton. The Chelsea, West Middlesex, Grand Junction, and Southwark and Vauxhall Companies, in accordance with the provisions of the Act of 1852, shortly afterwards constructed works at Hampton, whence they have since drawn their supply. The nature and extent of the works constructed by each company are set forth in detail in the Appendix, No. 1, to this Report.

16. In the construction of the works, and otherwise providing for a supply from them, the following sums have been expended by the five companies since 1852:—

	£.
The Chelsea Company - - - - -	525,756
The West Middlesex - - - - -	292,271
The Grand Junction - - - - -	391,440
The Southwark and Vauxhall - - -	661,179
The Lambeth - - - - -	559,321
	£. 2,429,967

From these works the five companies obtained an average supply of water daily in the year 1856, the first after the Act came into full operation, amounting to the following quantities:—

	Gallons.
The Chelsea Company - - - - -	5,532,000
The West Middlesex - - - - -	6,005,293
The Grand Junction - - - - -	5,478,361
The Southwark and Vauxhall - - -	10,531,122
The Lambeth - - - - - -	5,391,000
TOTAL - - -	32,937,776

17. The quantity of water drawn from the Thames has gradually increased since 1856 to the following extent in the past year:—

	Gallons.
The Chelsea Company - - - - -	8,000,000
The West Middlesex - - - - -	8,208,168
The Grand Junction - - - - -	9,317,255
The Southwark and Vauxhall - - -	12,502,000
The Lambeth - - - - - -	8,950,000
Total - - -	46,977,423

18. It is by no means easy to determine what may be the further requirements of the metropolis, which would mainly depend upon the growth of its population. The estimated number of persons now supplied by these companies is 1,369,090.

19. Without pursuing a minute inquiry into the causes which may affect the increase of this population, it may be assumed that if it should double within the next 60 years, the supply of water which would then be required, at the present rate per head, would not exceed 100,000,000 gallons daily.

20. But in speculating upon any works to provide for so distant a future, it should not be forgotten that a present expenditure, with compound interest at the commercial rate of 5 per cent., is equivalent to an expenditure of more than eight times the amount at the end of 60 years, and is subject to the risks of the works not being required at all, or not being found best adapted to the state of facts which may then exist.

21. It is shown by the evidence given before your Committee, which they see no reason to doubt, that the smallest quantity of water known to flow down the Thames at the source of supply, in the driest time on record, exceeds 350,000,000 gallons in a day, and that the maximum flow in a time of flood exceeds twenty-five thousand million gallons, whilst the daily average flow in the dry season may be estimated at five hundred million gallons.

22. If, therefore, at any future period the increase of population should render it necessary to make provision for a greater supply of water than could be conveniently drawn from the Thames in the dry season, it could be adequately made by storing up in reservoirs in the valley of the Thames a portion of the flood water, which now yields in a single day a sufficient supply for a whole year.

23. Your Committee have also examined how far the quality of the water of the Thames has been affected by the provisions of the Act of 1852, before mentioned; they find that in 1856 an examination was made by A. W. Hofmann, Professor of Chemistry in the Metropolitan School of Science, and Chemist to the Museum of Practical Geology, and Lindsey Blyth, Esq., Lecturer on Natural Philosophy at St. Mary's Hospital, who reported, amongst other things,—

> "*A very considerable diminution, however, is observed in the amount of organic matter.*
>
> "In fact, in 1856, the waters supplied to the metropolis contained not more than one-half of the organic matter which was present in the year 1851.
>
> "This result is certainly not accidental. The diminution is not merely an average result, but uniformly observed throughout."

24. Evidence has been laid before your Committee of a minute analysis of the water recently made, and which will be found in the Appendix, No. 3, showing that, as far as chemical science and other means of comparison admit, the quality of the water drawn from the Thames has been still further improved, and may be advantageously compared with the water generally supplied to towns in England.

25. It is right, nevertheless, to observe that chemical and other science fails to detect the presence of impurities in water which, it is said, may exercise a prejudicial influence on the health of the consumer, though the presence of certain chemical substances may suggest a suspicion of other inappreciable impurities. It is therefore concluded, that the only mode of securing water against these possible causes of danger is to prevent its being mixed with sewage or other known sources of contamination.

26. The Report on the River Thames of the Commissioners appointed to inquire into the best means of preventing the pollution of rivers, presented to the House by Command, in 1866, sets forth in detail the numerous sources of pollution to which that river was exposed from the sewage of towns on its banks, and its tributaries. It is unnecessary to enter at length into this subject, as Parliament, by an Act passed in the last Session, and the House by a Bill passed in the present Session, have adopted such measures as are at present deemed practicable to avert the flow of the sewage of towns, or other noxious matters into the river.

27. Your Committee, however, may remark that these measures do not extend to the tributaries of the Thames beyond three miles from their junction with the river; and that whilst the Water Companies directly, and the inhabitants of the metropolis indirectly, through them, contribute largely to the funds for the maintenance of the River Thames in a proper state, they are not represented on the Board of Conservancy of that river; that, therefore, those who have the greatest interest in seeing that the measures of the past and present year are properly carried into effect, are deprived of the opportunity of so doing. Your Committee recommend that some representatives of the Water Companies drawing their supply from the Thames, and of the Metropolitan Board of Works, should be added to the Conservancy of that River, to protect the water supply of the metropolis.

28. Your Committee are satisfied that both the quantity and quality of the water supplied from the Thames is so far satisfactory that there is no ground for disturbing the arrangements made under the Act of 1852, and that any attempt to do so would only end in entailing a waste of capital and an unnecessary charge upon the owners and occupiers of property in the metropolis.

29. The New River Company continues to draw the water supplied by it from the springs at Amwell, which afford about 4,000,000 gallons daily, and from the River Lea. The East London Company also continues to draw its supply from the same river.

30. The quantities of water supplied by the two companies in 1856, and the increase in 1866, were as follows:—

	1856.	1866.
The New River, from the Lea and the Amwell springs - - -	23,396,400 galls.	22,289,769 galls.
The East London Company from the Lea - - - - - -	14,562,684 „	19,380,739 „
	37,959,084 „	41,670,508 „

Showing an increase of 4,319,424 gallons in the period of 10 years. The population supplied by these Companies has largely increased in the same period, and is now estimated at 1,458,570.

31. On the passing of the Act of 1852, works were constructed by the two companies in accordance with its provisions. There have also been since constructed, by the New River Company, works for the purpose of intercepting the drainage of the town of Hertford, and passing it into the river below the point from which the New River is supplied with water from the Lea.

32. The East London Company has likewise constructed works for the purpose of obtaining a supply of water at Tottenham, higher up the Lea than the place whence it was formerly drawn, and has constructed a main drain for the purpose of intercepting the flow of sewage into the river between Tottenham and a point about four miles higher up the river, called Ponder's End.

33. The New River Company has expended about 800,000*l.*, and the East London Water Company about 700,000*l.*, in effecting these improvements in their sources of supply, in giving effect to the provisions of the Act of 1852, and extending their supply.

34. It is unnecessary to enter upon any inquiry into the fitness of the River Lea as a source of supply, as the Commission appointed to inquire into the pollution of rivers have recently issued a report on that river, which has been laid before the House by Command.

35. The Commission have arrived at the conclusion, that the extreme dry weather flow of water down the river at Lea Bridge is little above 40,000,000 gallons in each day of 24 hours; but as the New River Company draws its supply above this point, the whole daily flow of the Lea in extreme dry weather would be nearly 60,000,000 gallons. The average daily flow of water in the River Lea is stated by a competent witness to be about 90,000,000 gallons.

36. Whilst, therefore, the river would admit of some increase in the supplies drawn from it by the two companies, any great addition to their present supply would entail upon them the necessity of constructing extensive reservoirs for the stowage of the water at other seasons of the year. An estimate was made by Mr. Rendel that reservoirs capable of holding 6,212,500,000 of gallons might be constructed in the valley of the Lea for 530,000*l.* The expediency of these works has been questioned, and others have been proposed instead to store 5,312,500,000 gallons at an estimated cost of 400,000 *l.* Should the necessity arise for storing water in the Lea valley, there does not seem to be any difficulty in carrying out the requisite works.

37. Each of the companies is at present entitled to draw 22½ million gallons daily from the River Lea, and such further quantity of water as the river will afford, in equal moieties, at their respective sources of supply, but so as to leave sufficient water in the river for the purposes of navigation. The companies pay, in exchange for these rights, to the trustees of the river, a considerable amount, which is applied by them in the maintenance of the river, and of the navigation connected with it.

38. In consequence of the great increase in the supply required by the East London Company, and the disadvantages to which it is exposed in drawing water much below the intake of the New River, it has already constructed a reservoir at Tottenham to store about 175,000,000 gallons; but the extreme dry season of 1864, as well as the events of last year, to which reference will presently be made, induced the company to apply to Parliament, in the present Session, to improve and increase their reservoir at Tottenham, so as to store 500,000,000 gallons of water. Your Committee have already reported in favour of the Bill for this purpose.

39. But it appearing that the water of the River Lea at the intake of the East London Company is liable at certain times to become so much contaminated as to be unfit to flow into the reservoirs, your Committee introduced a provision into the Bill, requiring the company to make such works in the channels of communication between the reservoir and the river as would allow the flow of water to be regulated from time to time, or be cut off. The control to be exercised over these works will be explained in a subsequent recommendation.

40. Although these additional works would be sufficient to meet the immediate requirements of the company, they would by no means provide for the wants of the population of the eastern part of London for many years to come, should it increase in the ratio of the last 30 years.

41. The East London Waterworks Company has therefore also applied to Parliament, in the present Session, for leave to construct works to obtain a supply of 10,000,000 gallons daily from the Thames, and such of the flood water in addition as they may desire to take, for which they are to make an annual payment to the Board of Conservancy of the River Thames. Your Committee have likewise reported in favour of the Bill for this purpose, and they are satisfied that with this increased means of supply there will be an abundant provision of water for the inhabitants of the eastern part of London for many years to come, nor will this addition to the supply already drawn from the Thames materially affect the conclusions which have been already expressed, either as regards the present or the future, on the sufficiency of the Thames to satisfy the wants of the metropolis.

42. Your Committee will now consider the quality of the water drawn from the River Lea. The Report of 1856, already quoted, applied equally to the water supplied from that river, and your Committee having received scientific evidence of the present quality of the water supplied by the New River Company and the East London Company, are satisfied that as far as chemical or other science affords the means of judging, the water is not only wholesome, but compares favourably with that supplied to other places.

43. It is, however, apparent, from the statements contained in the Report of the Royal Commission on the River Lea, that the main stream and its tributaries are subjected to a degree of pollution from the flow into them of sewage or noxious matters, and below the intake of the New River, to such a degree that the water is exposed to great risk of becoming injurious to health by the infusion of matters which defy detection by scientific means. The Commissioners, in order to repress this source of danger, have submitted the following recommendations:—

> "That the charge of the entire watershed of the River Lea be vested in a Conservancy Board, consisting of 15 members, to be appointed as follows:
>
> > "Five members to represent the navigation, the first five to be the present chairman of the Lea Trust, with four of the existing trustees to be elected by the existing body; future vacancies to be filled up by election by members of Lea Trust.
> >
> > "One member to be nominated by proprietors of Stort Navigation.
> >
> > "Two members to represent the New River Company, viz. the chairman, deputy chairman, or treasurer, for the time being.
> >
> > "Two members to represent the East London Waterworks Company.
> >
> > "Two members to be appointed by the corporation of the City of London.
> >
> > "One member to represent and be chosen by traders on the Lea and the Stort.
> >
> > "One member to be nominated by the Home Office.
> >
> > "One member to be nominated by the Board of Trade.
>
> "That the powers and property of the Lea Trust be transferred to the said Conservancy.
>
> "That the Conservators receive powers to purchase the Stort Navigation, with a view to consolidate it with the navigation of the Lea.
>
> "That after the lapse of a period to be allowed for alteration of existing arrangements, it may be made unlawful for any sewage, unless the same has been passed over land so as to become purified, or for any injurious refuse from manufactures or agriculture, to be cast into the River Lea, or into any of its tributaries, and that persons offending in this respect be made liable to penalties, to be recovered summarily.
>
> "That it be incumbent upon the Conservators to see to the enforcement of the prohibitions that may be established against pollution of the river, and that for this purpose power be given to them to visit and inspect works, and, after due notice, to close the outlets of sewers, drains, and discharge-pipes into the river or its tributaries.
>
> "That, in the event of the funds derived from the navigation, together with the annual payments now made by the New River and East London Waterworks Companies, proving insufficient to meet the expenses of measures taken by the Conservators for the protection of the river from pollution, the said companies be called upon to contribute, in equitable proportions, such further sum as may be necessary, not exceeding a maximum to be fixed by Parliament.
>
> "That powers be given to the Conservators to make embankments, and to drain and improve marsh lands, and carry out arterial drainage operations, the cost of such improvements to be met by a rate upon the properties so improved.
>
> "That the Public Works Loan Commissioners be authorised to make advances to the Conservators upon such security as shall seem sufficient.
>
> "That Legislative measures be passed to render it compulsory upon each company to supply water upon the 'constant system' throughout its district, and

and upon owners of houses to furnish their houses with proper arrangements to receive such supply."

44. Whilst your Committee entirely concur in the purposes for which these recommendations are made, they are of opinion that some of them require reconsideration, for reasons which they will briefly state.

45. By the Act for the regulation of the River Lea, passed in 1854, all the water of the river, subject to the jurisdiction of the trustees of the river, is vested in the two Water Companies, subject to the requirements of the trustees for the purpose of navigation, in order that the water may be used by the two companies for the supply of the metropolis; and as under the provisions of this Act large payments have been made and are annually contributed by the two companies, which ultimately fall on the inhabitants who pay water rates, and who, as the consumers of the water, have the greatest interest in its purity, your Committee are of opinion that, for the purpose of protecting the interest of the inhabitants in any Board of Conservancy which may be constructed, they should be represented on the Board, by the nomination of members by the Metropolitan Board of Works.

46. To improve the purity of the water of the Lea, plans have been submitted to your Committee for what are called comprehensive schemes for disposing of the sewage of the valley of the river, which, though imperfect, would require a large outlay. But as they would only collect the sewage into a considerable volume, rendering it more difficult to dispose of it with advantage at the place of outfall, your Committee are not prepared to recommend the adoption of these schemes.

47. Your Committee are of opinion that if each town or place were compelled to intercept its sewage, and apply it to some adjacent land, the whole of the sewage of the towns on the River Lea and its tributaries, might be diverted from the river at a comparatively small cost, and with great agricultural profit. By these means each town would bear the cost, and enjoy the advantages resulting from its own sewage; and as the quantity of sewage would be in proportion to the population, each place would be treated with an equal measure of justice.

48. Considering the amount already contributed by the two Water Companies to the funds of the Commissioners, and the large expenditure of the metropolis to effect its own drainage and to dispose of its own sewage, so that it may not be an injury, or even inconvenience to others, and that the Water Companies are assessed to the rates for this purpose, your Committee see no reason why they or the inhabitants of the metropolis should be called upon to pay the expenses of similar works carried on by other towns, for the purpose of preventing the sewage of those towns becoming injurious, or a nuisance.

49. On the recent outbreak of cholera in the east of London, it was ascribed by the Registrar General to the bad quality of the water supplied by the East London Waterworks Company to a part of the east of London. Attention having in consequence been directed to the state of the company's works at Old Ford, they were subject to so much animadversion that the inhabitants at length applied to the Board of Trade to institute an inquiry under the provisions of the Act of 1852. The Board of Trade, in the month of November 1866, appointed Captain Tyler to conduct the investigation. His report of the 27th May 1867 having been laid before the House, your Committee need not enter into this subject further than to notice the conclusions at which he has arrived. He reported that he was not prepared to go so far as the memorialists in asserting that the water was the principal, if not the sole, cause of the fearful mortality from cholera. He concurred in the view already expressed by the Royal Commissioners, that the River Lea is much contaminated by sewage before it reaches the company's works at Lea Bridge; that the company suffered from such contamination as well as the public, and they ought to receive, in the interest of a quarter of the population of the metropolis, all the assistance that Parliament can afford towards its alteration. He was of opinion that the water of the Lea found its way into the covered reservoirs of the company at Old Ford, and that there was no doubt of the impure quality of that water; and he recommended certain works for the improvement of the reservoirs and filtering beds of the company.

50. Passing by, for the present, other recommendations in Captain Tyler's report, your Committee express their general concurrence in these conclusions; but at the same time they think it right to observe, that the evidence leads to the opinion that the spread of cholera might equally be ascribed to defective sanitary arrangements, and to other causes.

51. The Water Company, however, in anticipation of the result of the inquiry, introduced in their Bill, already noticed, provisions to enable them to improve their works at Old Ford, so as to guard against the pollution of the water supplied by them in future from their reservoir at that place; and as in the amended Bill reported by your Committee these provisions are made compulsory, the recurrence of the evils which have arisen will be prevented. It appearing desirable that the East London Company should commence the works without delay, your Committee deemed it expedient not to delay these Bills until they had reported on the general questions referred to them, but to prevent any misapprehension from this course, your Committee recorded the following resolution:—"That the Committee, in passing the preamble of the Bill, reserves the consideration of any Amendments which they may deem it expedient to recommend in the 'Metropolis Water Supply Act, 1852.'"

52. To give effect to the views above expressed respecting the River Lea, your Committee recommend that a Bill should be introduced in the next Session, by the Board of Trade.

53. When the remedial measures thus recommended are carried out, the River Lea will be as free from the risk of contamination as the River Thames, and will afford a supply of wholesome water of unquestionable character to the East London Waterworks Company at the lower source of supply, as it now does to the New River Company, from its intake near Hertford.

54. The North Kent Company, since the Act of 1852, has entirely abandoned the River Ravensbourne as a source of supply, and draws its water from deep wells sunk in the chalk formation on the south side of the Thames. In these works, of which a description will be found in Appendix No. 1, the company has spent 198,000*l.*

55. In 1856, the company supplied on an average 2,340,000 gallons daily; it now supplies 6,150,000 gallons daily to a population of 237,068. It appears, from the evidence laid before your Committee, that the quantity of water which may be drawn from the wells now in use, and others which might be sunk, may be easily doubled. Your Committee are therefore of opinion that the Kent Water Company also possesses an adequate supply of water, both for the present and for many years to come.

56. With regard to the quality of the water supplied by this company, no question has ever arisen. Though it appears from the analysis of it given in evidence, that it contains a somewhat large per-centage of lime, yet the amount is comparatively small, and it seems from the medical evidence that it is not such as to have any injurious effect on the health of the consumer.

57. In concluding the remarks of your Committee on the character of the water supplied to the inhabitants of the metropolis, it may be desirable to notice the scientific evidence given on two other points which have created some prejudice against the quality of the water.

58. It is stated that though the water supplied is somewhat hard from the presence of lime, it possesses in consequence the property of not decomposing leaden pipes or cisterns, whilst by boiling in the usual manner for domestic use, it loses the greater part of its hardness, and becomes as soft as any soft water which can be generally obtained from natural sources.

59. It is also stated, that the power of running water to purify itself is so great, that notwithstanding the quantity of drainage flowing into the Thames and the Lea and their tributaries, these rivers, aided by the animal and vegetable life with which they abound, are capable of purifying their waters so as to

render them perfectly wholesome when they reach the consumer, after undergoing the filtration to which they are subjected.

60. However abundant or wholesome the water may be which the companies are enabled to supply, the advantage which the inhabitants of the metropolis can derive from it, nevertheless, depends upon the excellence of the arrangements by which they can procure it at all times of the day in the manner best adapted for every domestic purpose, as well as for all public objects; it is, therefore, necessary to inquire how far the Act of 1852, qualified by the other Acts relating to the supply of the metropolis, has proved sufficient to attain this object.

61. By the Act of 1852, every company, after the 1st of July 1853, was to prepare a map of the district in which its pipes were laid, and was to cause to be marked on the map all existing mains and district mains, and from time to time all additions and alterations so as to show the situation of all mains and district mains, and was to keep the maps for public inspection.

On application of any person supplied with water, the company was to furnish the particulars of the district main from which the applicant was supplied, and of the streets in which the district main was laid.

After the 1st of July 1857, every company was, on the requisition of four-fifths of the owners or occupiers of houses on a district main, to provide a constant supply of water, reaching to the top storey of every house, unless the company could show that one-fifth of the houses on the district main were not properly fitted with apparatus for a constant supply.

In case a constant supply should be thus provided, every person supplied was to provide a cistern with efficient apparatus, and other arrangements, to prevent waste, and in case the person supplied should, after notice from the company, fail to keep them in good order, the company was to be at liberty to refuse or cut off the supply.

All houses having constant supply were to be subject to inspection during the daytime.

All domestic arrangements for receiving a supply of water were to be such as to prevent waste or misuse of water, or the flow of foul air or other matter into the company's pipes; otherwise the water was not to be supplied.

The company is entitled to recover, by action or suit, any damage it may sustain from the wrongful acts of consumers, as well as cut off their supply of water.

No communication pipes were to be laid by any person to the company's mains without previous notice to the company, and the company was to be at liberty to make rules with the sanction of the Board of Trade to prevent misuse or waste of water; and to prescribe the nature of the apparatus and fittings to be used in houses, and, in the event of these rules being violated, the supply might be cut off.

To ensure the provisions of the Act for a proper supply of water being carried out, the Board of Trade was empowered to appoint a person from time to time to inspect the works of the companies, and to inquire into complaints; to adopt proceedings in Chancery to compel the companies to do what was lawfully required of them, or to restrain them from doing wrong, and penalties were imposed upon the companies for failing to comply with some of the provisions of the Act.

There is also a further provision for the supply of water to the smallest class of houses, which will be subsequently noticed in connection with that question.

The metropolis, as defined by the Act of 1852, is somewhat more extensive than the metropolis defined by the Metropolis Local Management Act of 1855.

62. But as all the companies are also subject to the General Waterworks Clauses Act, passed in 1847, it is necessary to advert to some of the clauses of that Act, which contains provisions relating to domestic supply, and is referred to in the Act of 1852, in order to give a complete view of the law applicable to the companies in general on this subject.

63. The Act of 1847 provides that there shall be a constant supply of water to the inhabitants of the place, supplied to the top storey of every house, but the

metropolitan companies are exempt from this clause, being subject to the Act of 1852 instead.

The companies are required to provide a supply of water to every owner or occupier who shall agree to take it for three years, and they are subjected to penalties for failing to supply water, except the default arises from frost, unusual drought, or other unavoidable cause or accident.

The companies are required, on demand of the owner of any house under 10 *l.* annual value, to lay down communication pipes, and other necessary works, for the supply of the house, if the companies' pipes have been laid down in the street, and to charge a reasonable rent for the same, in addition to the authorised water rate, to be recovered in the same manner as the rate; the amount of rent to be settled by the inspector, or, if there be none, by two justices; for neglect a penalty is imposed on the company, but if the rent is not paid, the company is to be at liberty to remove the communication pipes and the works, at the expense of the owner, or at the expense of the occupier, to the extent of the rent of the houses.

Provision is also made for the inhabitants laying down communication pipes, but from this clause the metropolitan companies are exempt.

When the water is not constantly supplied under pressure, a cistern is to be provided by any person supplied with water, with proper apparatus to prevent waste, and in default the company may cut off the supply.

Any person suffering a cistern or apparatus to be out of repair, so that the water may be wasted, is liable to a penalty not exceeding 5 *l.*

The company is empowered to enter houses in the daytime to inspect, and if obstructed to cut off the supply.

There are penalties imposed on persons receiving supply, for improperly allowing other persons to use the water, on persons improperly taking water, and on persons wilfully or carelessly injuring or opening any apparatus of the company whereby water may be wasted.

There are also provisions for guarding against fouling the water of the companies in any stream, reservoir, or aqueduct, or works of the company, or in their pipes.

From all the pipes where fire-plugs are fixed, the companies are bound to provide a constant supply of water, for cleansing sewers and drains; for cleansing and watering the streets; for supplying any public pumps, baths, or washhouses established for free use, or paid for out of poor or borough rates.

These special supplies are to be provided at such rates as may be agreed upon between the company and the local authorities, or decided by an inspector, if there be one, and if not by two justices. This inspector is defined to be the officer appointed by the local authorities for the inspection of paving, drainage, or the supply of water in the district, alone or jointly with other districts.

There are also provisions for the payment and recovery of the water rates, which are to be computed on the annual value of the tenement, such value, in case of dispute, to be assessed by two justices.

The owners are liable for the water rate, instead of the occupier, for houses of less annual value than 10 *l.*; but in the metropolis this limit is extended to 20 *l.* by the special Acts of these companies.

In the event of the water rate not being paid, the company is at liberty to cut off the supply.

The profits of the company are restricted within the limit of 10 per cent. per annum, and if they exceed that amount a rateable reduction is to be made in the water rate.

Penalties imposed within the metropolitan police district are to be recovered and disposed of in the same manner as other penalties under the Metropolitan Police Acts.

64. Each of the companies is, however, further regulated by its own special Acts, which contain provisions defining the districts to be supplied by each company, limiting the height to which the company is bound to afford a supply, prescribing the maximum rates to be charged by the company for water, and otherwise affecting the conditions under which the supply is to be given.

65. It is now to be considered how far these several enactments have secured a proper supply of water to the metropolis for domestic and other purposes.

66. The difficulties of affording a full supply without waste are much greater than might be anticipated, and the difficulty of effecting a change from any system of domestic supply already established to another system is even greater. The subject is also beset with much confusion, which cannot be better illustrated than by the contradictory provisions in the Acts of 1847 and 1852. In the former the use of a cistern is not rendered obligatory where there is a constant supply of water to each house, but only when the supply is intermittent; in the Act of 1852 the use of a cistern is peremptorily made a condition of a constant supply.

67. The Act of 1852 is so framed that the introduction of any constant supply depends upon its provisions relating to the preparation of plans, and the proceedings consequent thereon, but these provisions have been too difficult of application to be carried into effect in a complete or satisfactory manner. With some trifling exceptions, therefore, the metropolis is now supplied by the water being turned on for a short time in each day, except Sundays, when no supply is given to the larger part of the metropolis. The occupiers are left to obtain and store as much of the supply as they may desire, or as the condition of their houses will admit.

68. The use of cisterns for the purpose of storing water for consumption is probably a more fertile cause of impurity than any pollution of the river from which the water is drawn. Decaying animal or vegetable bodies, or other impure matter, may easily find their way into a cistern, and are more likely to engender disease than any impurity existing in the water before it flows into the cistern. In well regulated houses the cisterns are of course constantly drawn dry, and properly cared for; but as cleanliness decreases, it is found that the cisterns are allowed to become more foul until the lowest state is reached, when the water is stored in tubs and otherwise, under the most disgusting conditions, which cannot but be injurious to health, and a cause of the diseases which are found to prevail in the worst regulated parts of London. On the other hand, an intermittent supply of water without cisterns not only deprives the inhabitants of the supply they ought to receive, but from the want of adequate storage it is kept in pails and other small receptacles, in rooms and places where it is liable to much contamination.

69. For these and other reasons, which will be found in the Evidence, and in the paper of Dr. Farr, No. 7 in the Appendix, and the report of Captain Tyler, which are full of interest, your Committee have come to the conclusion that the Act of 1852 has failed to secure for the inhabitants the advantage which they ought to have long since enjoyed of a well-regulated supply of water in their houses for domestic purposes; your Committee therefore recommend that the Act should be amended by providing that every company should afford a constant supply of water to each house, so that the water may be drawn direct from the company's pipes at all times during the 24 hours with the exceptions hereinafter mentioned.

70. It is right, however, to observe that this recommendation cannot be carried into effect unless adequate provisions are also made to prevent the waste of water which may arise from its being constantly laid on in every house. To determine how far water may be, and is in fact now wasted in the metropolis, much evidence has been given which is deserving of notice.

71. The average supply of water per house and per head of the population in the metropolis at the present time, exclusive of water for manufacturing purposes, for watering streets, and other public objects, is as follows:—

NAME OF THE COMPANY.	Gross Average Daily Quantity in 1866.	Quantity for other than House Supply.	Quantity for House Supply.	Number of Houses.	Quantity per Each House.	Population, estimated at about	Quantity per head of Population.
RIVER LEA COMPANIES:	*Gallons.*	*Gallons.*	*Gallons.*		*Gallons.*		*Gallons.*
New River Company -	22,898,769	4,361,965	18,536,804	109,198	169·75	800,000	23·17
East London Waterworks Company.	19,380,000	5,000,000	14,380,000	90,174	160 (nearly)	658,570	22 (nearly)
TOTAL drawn from the River Lea and the Wells of the New River Company -	42,277,769		32,916,804			1,458,570	
THAMES COMPANIES:							
Chelsea Waterworks Company.	8,000,000	1,193,000	6,807,000	26,900	253	201,000	33·86
West Middlesex - -	8,208,168	556,000	7,652,168	36,500	210 (nearly)	255,500	30· (nearly)
Grand Junction Waterworks Company (Michaelmas, 1866):							
Supplied to tenants -	8,778,205	653,846	8,124,359	26,450	307	238,050	34·
Used for sand-washing, condensing, &c., at the Company's Works.	538,850	—	—	—	—	—	—
Southwark and Vauxhall Water Company (Michaelmas, 1866).	12,502,000	3,076,712	9,425,288	66,530 2,215 2,235	132¾	449,540	21·
			TOTAL -	70,980			
Lambeth Waterworks Company.	8,950,000	1,251,000	7,699,000	37,203	207	225,000	34·22
TOTAL drawn from the Thames - -	46,977,223		39,707,815			1,369,090	
Kent Waterworks Company -	6,150,000	366,000	5,784,000	33,864	171	237,068	24· 4
			78,408,619			3,064,738	

The discrepancies and difference in the supply of the several companies will be found explained in the Table in the Appendix, No. 4.

72. It has been ascertained by admeasurement, that the water consumed by the occupants of houses of the unwealthy classes does not exceed 6½ gallons a day, a result which may be otherwise estimated as follows:

By the Ships Passenger Act, one gallon a day is provided for each passenger, which is deemed sufficient for food and limited ablution. It appears by the evidence two gallons are sufficient for flushing a water-closet, and the remainder may be regarded as sufficient for any other domestic purpose.

73. In the higher class of houses there is of course a much larger consumption from the use of baths and otherwise; but there is no reason to doubt that an average of 20 gallons a day per head is an abundant allowance for all domestic purposes, allowing for considerable, but perhaps unavoidable waste.

74. Comparing this with the quantity at present supplied, it would result as follows:—

Present average supply daily - - - -	78,408,619 *galls.*
Present population at 20 gallons daily - -	61,294,760
Showing a probable daily waste at present of - -	17,113,859 *galls.*

75. From experiments made on several occasions in the metropolis, it has been found that where the supply was suddenly changed from the present intermittent system, to a constant supply, without any alteration of the arrangements in the houses, there was an enormous waste of water. The experience derived from changes made from an intermittent to a constant supply in other towns, without suitable arrangements within the houses, leads to the same result.

76. Your Committee have therefore endeavoured to ascertain the precise causes of this waste, and the means by which it may be obviated.

77. With regard to the constant direct supply of water to a tap in the house, it appears that no waste is likely to occur if it be so placed and arranged that waste cannot take place without producing inconvenience, which will be immediately felt by the person permitting the waste, and that there are no real difficulties in fulfilling these conditions.

78. All other modes of supply afford opportunities of waste, which it is not so easy to prevent. The ordinary cistern is so liable to occasion waste, that it has been found requisite in other places to lead the waste-pipe into some exposed position, where any flow from it can be immediately detected. It would no doubt be necessary to make this alteration when a cistern is maintained, but as it would be easy to substitute a direct service, without the intervention of a cistern, except for hot-water services or closets, no difficulty need be apprehended on this account.

79. But with regard to the supply of water-closets, it has been shown that in consequence of the practice of allowing the water to flow through them uninterruptedly for long periods, instead of merely flushing them, they are a frequent cause of great waste, which cannot be detected; there appears, however, to be no difficulty in guarding against this by making such arrangements for flushing, that the water cannot flow on continuously for an unlimited period

80. It has indeed been objected by some of the witnesses, that it will be found impracticable to maintain any flushing apparatus in proper order in houses frequented by the most negligent people, and that it would be better in these cases to leave them to draw water and flush with a pail. If this were a question affecting the individuals only, such an arrangement might be tolerated, but the health of the public being greatly concerned in the rapid removal of all matters which may either engender the forms of disease, for the most part infectious, found in ill-regulated habitations, or may tend to spread such disorders when they arise from other causes, your Committee are of opinion that the introduction of a flushing apparatus where no water service now exists ought to be imposed on the owner of every house, without prejudice to his right to recover the cost from the tenant, if the latter be under an obligation to incur the expense.

81. The other special services provided with cisterns will be of a limited character, under conditions where the waste is not likely to be considerable, and it will be sufficiently guarded against by the arrangements recommended.

82. It has also been objected by some of the witnesses that there is no remedy for one of the chief causes of waste in certain localities, which is to be found in the tendency of evil-disposed persons to take away all fittings of brass or copper.

83. Your Committee have, however, been informed that it is not impossible to remove much of this temptation by reducing the present use of copper and brass in such fittings; but as the removal of the fittings undoubtedly causes great waste of water and loss to the companies, as well as great inconvenience and injury to the public, your Committee are of opinion that the unlawful removal of fittings should be made a specific offence, punishable summarily with imprisonment, and that the sale of such fittings, if marked with some certain initial letters, should be placed under the same restrictions as the sale of stores with the mark of the Crown on them, by which the unlawful traffic in such fittings would be repressed.

84. It has been further objected, that if the constant supply were laid on in each house, there would be great danger of the house pipes bursting in frosty weather; but it has been stated in reply, that this cause of danger may be easily obviated by the water being turned off at the stop-cock at night, and the house pipes being emptied by drawing the water off at the lowest tap in the house. This precaution is so simple as to render the objection undeserving of further consideration.

85. It has been urged by the water companies that a constant supply would

endanger the pipes which have been laid down by the owners of houses between the house and the pipes of the company, called communication pipes; but as this would depend upon the arrangements which the company might think fit to make to regulate the pressure or height of the head of water supplied, which would involve much interference with the operations of the company, your Committee recommend that all the communication pipes under the streets and pavements, up to and inclusive of the stop-cock, if any therein, should be vested in the company, and that all future communication pipes up to and including a stop-cock, should be laid down by the company at established rates of charge, at the expense of the owner, and then vested in the company, and that both those now and hereafter laid down should in future be kept in repair by the company; that it should be penal to use the stop-cock contrary to any rule of the company for cutting off the supply of water.

86. The companies would thus be left free to make their own arrangements so long as they deliver a sufficient supply of water for the upper storey of each house within the limits of height which are or may be prescribed.

87. It may be necessary to make an exception to meet the case of rows of houses of small value. It has been suggested by some of the witnesses that, for the sake of economy, these houses may be supplied by a small iron pipe, running through the houses, with a separate branch pipe and tap for each house. Your Committee recommend that in this case the companies should not be required to provide more than one communication pipe, with a stop-cock at the commencement of the through iron pipe; but it being impossible to define beforehand the occasions when this arrangement may be desirable, it should be left to the inspector to decide in each case in the event of disagreement between the owners or occupiers and the company.

88. Considering the improvements that are constantly taking place, both in economy and perfectness of construction in mechanical contrivances, and the difficulty of providing against inconvenience which may arise, your Committee do not think it desirable that any precise mode of effecting a constant house supply, or any particular kind of apparatus, should be enjoined in a statute, but that the companies should be required, in conjunction with the Metropolitan Board of Works, to frame rules, with power to alter them in like manner, for the purpose of prescribing the arrangements within the house to carry out the general principles above noticed, and that any violation of these rules should be penal.

89. To facilitate the application of these rules at the least possible expense and inconvenience to the owners and occupiers of houses, your Committee recommend that the companies should at the request of the owner or occupier provide all the fittings and apparatus required by their rules, and keep them in repair at established rates of charge, in estimating which due regard should be had to the fact that they would have to make a periodical inspection for their own protection at their own expense; and that when the fittings and apparatus are supplied by others, they should be put up in the prescribed manner, to the satisfaction of the water company, and that for this purpose standard patterns should be kept by the companies and by every local authority in the metropolis.

90. The constant supply of water to each house thus recommended will no doubt entail upon the companies a watchful supervision on the internal fittings and apparatus, for which sufficient powers are contained in the Acts above noticed; but as they will be relieved of the trouble and expense of turning on the water, which they now have to do under the intermittent system, your Committee do not consider that the companies have any valid objection or claim to indemnity on this account.

91. But though every arrangement may be made by the companies, assisted by legislation, for the proper supply of water to each house, experience has shown that it is absolutely necessary to invoke the aid of some constituted authority to ensure the houses being in a state that the inhabitants will receive it under such conditions as are essential for health, by enforcing a compliance with the provisions of any law which Parliament may deem requisite.

92. The statutory provisions already made in this direction are in the following Acts:

93. By the Act of 1852 it was provided that where it appears to the churchwardens and overseers of the poor of any parish that any house which can be supplied at the rate of 3*d.* a week is without a proper supply, those authorities, with the consent of the vestry, may compel the owner or occupier to make provision for such supply, and that the water rate, not exceeding 3*d.* a week, shall be paid by the owner.

94. This provision, though not actually repealed, was virtually superseded by Section 67 of the Metropolis Local Management Amendment Act of 1862. By this Act the vestries and district boards of the metropolis are empowered to compel the owners of houses to make such arrangements as are requisite for a proper supply of water, where the houses can be supplied at a rate not exceeding 3*d.* a week. If the owner neglect to do the work, it may be done by the vestry or board at his expense. The water-rate is to be paid by the owner. By Section 70 of the same Act, the local authorities are empowered to provide a supply of water for drinking fountains. In case the supply to any house be insufficient, by reason of its being occupied by more than one family, the vestries and district boards are empowered to compel the owner to provide for a supply not exceeding 30 gallons a head daily, and in case the owner shall fail to fulfil the order for that purpose, the house is to be treated as an overcrowded dwelling; that is, the person permitting the overcrowding is to be liable to a penalty of 40*s.*, and to a penal order from the magistrate to diminish the number of persons in the house.

95. By the 81st section of the Metropolis Local Management Act of 1855, it is declared to be unlawful to erect any house, or to rebuild any house pulled down to a certain extent in the metropolis, without a sufficient water-closet furnished with suitable water and supply apparatus, or a privy furnished with suitable trapped soil-pan, works, and arrangements necessary to insure the efficient operation thereof, under a penalty of 20*l.* It is also enacted, that every house then built shall be provided with the like arrangements on the requisition of the vestry or district board, in case the same can be done without disturbing any building. But the local authorities may allow the continued use of a water-closet or privy, already existing in common, by the inmates of two or more houses.

96. Under the Public Health Act of 1866, extensive general powers are conferred by Sections 21 and 22, on the vestries and district boards, to prevent any nuisance, either from defective construction, or neglect of cleanliness; and as regards the number of persons who may occupy a house, or part of a house, beyond one family, a power is conferred by Section 35 to make rules for enforcing privy accommodation, and other appliances and means of cleanliness, in proportion to the number of lodgers. For the neglect of these rules penalties are imposed. By Section 34 of the Act, all charges which the local authorities are entitled to have reimbursed from the owner of premises may, if not paid by him, be recovered from the occupier by compelling him to pay over his rent to the local authorities until the demand is satisfied.

97. These various provisions of the law would seem to be ample for the purpose of ensuring a due supply of water for all purposes for the inhabitants of the metropolis in every house, but your Committee regret to state that they have hitherto failed to effect this desirable object, more especially in the cases where a proper supply of water is most essential.

98. The Act of 1847 contemplated the appointment of inspectors for the purpose of securing an efficient discharge of the obligations of the Water Companies, but as the districts supplied by the companies are not conterminous with those under the jurisdiction of district local authorities, it is obvious that much inconvenience might arise from the independent action of several inspectors over the operations of each company. But the Metropolitan Board of Works, under the Metropolitan Building Acts, appoints surveyors for the purpose of enforcing compliance with those Acts throughout the metropolis, and as the surveyors are persons of skill, and have analogous duties to perform, they might be advantageously employed as inspectors for the purpose of seeing that houses are fitted with proper arrangements for the supply of water for all purposes. Your Committee therefore recommend that the Metropolitan Board should be required to cause an inspection of all houses, and a report to be made on

all defects in the supply of water either for consumption or for water-closets or privies, and that the Board should be required to compel every house to be supplied with water and every privy with a flushing apparatus, as recommended in the foregoing part of this Report.

99. Much unnecessary trouble and expense might be avoided if the surveyor were empowered to act as an arbitrator, and to decide summarily, on inspection, all disputes arising between the companies and owners or occupiers respecting the proper fittings of any water supply apparatus, or its cost.

100. Your Committee recommend that whatever charges may be payable to the companies from the owners or occupiers under the foregoing recommendations, should be recoverable by them with the same facility as their water rates, and that the provisions of Section 34 of the Act of 1866 above noticed, should also be extended to all expenses incurred by the Metropolitan Board, or any other local authority in making arrangements for ensuring an adequate domestic supply.

101. Some incidental subjects remain to be noticed. Complaints may arise in certain localities that the water is not laid on to a sufficient height. It has been already observed that the companies have protected themselves in this respect by their special Acts. It would require minute technical inquiry to determine whether the companies could be fairly compelled to deliver the water at any greater height where it is now proved to be insufficient, without incurring an expense, and subjecting other localities to an inconvenience, which would render a change unreasonable. Your Committee, therefore, deem it better that such questions should be deferred until the Metropolitan Board shall have had an opportunity of examining into them, and communicating with the companies on the subject, for the purpose of applying to Parliament, if necessary; but in the meantime the Kent Company, having admitted their ability to supply water at an elevation 100 feet higher than the limit at present prescribed for that company, the provisions of their Act should be amended accordingly.

102. In applying the provisions of the Act, enabling the local authorities to obtain a supply for watering streets, some difficulty has arisen as regards the rate to be paid for supply for public purposes; but when a constant supply is laid on there will be no reason why the local authorities should not be regarded as ordinary consumers, and be supplied at the same rate, and we recommend that the Act of 1847 should be amended so as to leave no doubt on this point.

103. The only question arising out of the water supply remaining to be considered is that for the extinguishment of fires. The law on the subject is to be found in several statutes, beginning with an Act passed in 1774, by which the churchwardens of every parish within the bills of mortality, and other adjacent parishes, and the overseers of the poor when there is no churchwarden, were to make and fix, at the charge of such respective parishes, upon the mains and pipes of every waterworks within the parish, such fire-plugs and fire-cocks as they might deem proper.

104. In 1865 the fire engine establishment of the insurance companies having been transferred to the Metropolitan Board, all the powers of local authorities in the metropolis respecting fire-plugs were transferred to the Metropolitan Board exclusively, and the water companies were required to provide at the expense of the Board, in any mains or pipes, plugs, at such places, of such dimensions, and of such form as the Board might require, and ample power was conferred on the Board to use the plugs, as also to shut off any mains to increase the supply of water for the purpose of extinguishing fires.

105. It has been represented to your Committee, on the part of the Metropolitan Board, that in consequence of the supply of water being intermittent, the inhabitants have not derived the benefit they are entitled to expect from this provision, and that in consequence of the plugs being unsuitable, the water cannot be at once discharged upon a fire without the intervention of an engine, as it otherwise might be. It would seem that when the supply is intermittent, the full pressure of the water at the particular time cannot be obtained until all the receptacles for water served by the main are filled, and the supply to them thus arrested, and that in order to obtain a full supply it is not merely necessary to draw the plug, but to understand the use of all the sluice cocks in the neighbourhood.

bourhood. These inconveniences would be entirely obviated by adopting the recommendation already made of a constant supply.

106. With regard to the ground of complaint respecting the plugs, it appears that it is chiefly, if not entirely, owing to the Metropolitan Board having had their attention directed to the most expensive, instead of the least expensive mode of effecting their object; and your Committee have no doubt that as soon as the constant supply is in force, and the Metropolitan Board applies its energies to providing the simplest and cheapest form of hydrant, instead of a common plug, they will be able, with some unavoidable exceptions, to throw the water directly from the company's mains, without the intervention of an engine, in sufficient quantity to arrest the progress of fires at their first outbreak.

107. It has been urged that it is impossible to deal with the case of large buildings recently erected in the neighbourhood of small houses when the supply of water is inadequate for the purpose of extinguishing a great fire; but your Committee are of opinion that there is no difficulty in a main being laid down in such cases under the clause of the Act of 1847, which may be amended in this respect if insufficient.

108. It is right to observe that the change of system recommended cannot be introduced at once throughout the metropolis, but each company must carefully examine and have put in order the fittings in the district supplied by a main, before the water is constantly laid on. To ensure this being done in due time, your Committee recommend that the Metropolitan Board should be empowered to direct, from time to time, within what period the constant supply should be introduced into each separate street or district. Your Committee think it right, however, that power should be reserved to the occupiers of houses of above 20 *l.* annual value, and not inhabited by more than a single family, to decline to avail themselves of a constant supply.

109. To enable the Board to discharge its duty, each company should be compelled to furnish the Board with an exact copy of the plans now kept by it, with all the indications on it, showing all the mains, pipes, sluice cocks, and communication pipes, as well as fire plugs.

110. It is worthy of remark that since the passing of the Act of 1852, there have been only three general complaints against the water companies, respecting their supply of water made under its provisions: one against the Kent Company in 1860, another against the Southwark and Vauxhall Company in 1863, which was renewed in 1864, whilst the works to remedy it were in progress; and the third against the East London Company last year, already noticed. The absence of complaints is not to be ascribed to the want of cause of complaint on the part of the poorer classes, but to their inability to enforce them, to the absence of sufficient power to compel owners and occupiers of houses to make proper provision for receiving water supply, and to the inefficiency of the provisions of the Act of 1852, and of other Acts above noticed.

111. It is no part of the legitimate duty of the Board of Trade to watch over the supply of water to the inhabitants of the metropolis. That duty should be performed by local authority with adequate facilities for receiving, and power for enforcing, the complaints of individuals. But as it is impossible to place the property and resources of the companies at the absolute disposal of a local authority when the companies are unable to agree with it in any general measures to carry out the laws which determine the relative rights of the companies and the inhabitants, the dispute should be settled by arbitration. Your Committee therefore recommend that the duty of seeing that the water companies adequately fulfil their obligations, should be imposed upon the Metropolitan Board, who can be conveniently assisted in the performance of this duty by the surveyors of buildings, unless it be found necessary to appoint one or more persons in their stead, to act as inspectors for the whole metropolis; and that when questions arise between the Metropolitan Board of Works and the water companies, respecting the obligations of the latter, or any of the other matters recommended in the former part of this Report, they should be determined by one or more arbitrators, to be nominated for the occasion, by the Board of Trade.

112. The law relating to the domestic supply of water in the metropolis, being scattered through the two General Acts of 1847 and 1852, and the Local Acts of the companies, is by no means so clear as is desirable. Your Committee therefore recommend that the provisions of all the Acts on this subject should be repealed, and one uniform Act, in clear terms, and introducing the amendments suggested by the foregoing recommendations, should be substituted, which may be readily understood both by the inhabitants and the local authorities of the metropolis, as well as by the companies.

113. Your Committee would willingly have avoided entering into the subject referred to them so much in detail. It would have been an easy task to have contented themselves with a few general recommendations, but, having found that in consequence of a disregard of details, the inhabitants of the metropolis have not enjoyed for 10 years the full benefit of a proper house supply of water, and that in no town in England a complete and satisfactory system of water supply for all purposes, without unnecessary waste, has yet been attained, your Committee have deemed it right to examine into the whole subject, in order that it may be no longer neglected.

27 *June* 1867.

PROCEEDINGS OF THE COMMITTEE.

Thursday, 28th March 1867.

MEMBERS PRESENT:

Mr. Benyon.
Mr. Knatchbull-Hugessen.
Mr. Ayrton.
Mr. Headlam.
Mr. Kekewich.
Mr. Sclater-Booth.
Mr. Baillie.
Lord John Hay.

Mr. *Ayrton* was called to the Chair.

The Committee deliberated.

Resolved, That the Water Companies subject to "The Metropolis Water Supply Act, 1852," furnish the Committee with information respecting the operation of the Act, and the supply of Water thereunder in a tabular form.

Resolved, That the Committee will meet on Tuesday the 30th April to proceed with the inquiry under the Instruction of the House.

Resolved, That the Committee will not then proceed with the inquiry into the Bills.

Parties called in, and informed of the Resolutions of the Committee.

[Adjourned to Tuesday, 30th April.

The Committee was postponed till Tuesday, 14th May.

Tuesday, 14th May 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Headlam.
Mr. Baillie.
Mr. Benyon.
Mr. Kekewich.
Mr. Sclater-Booth.
Colonel Hogg.
Lord John Hay.

EAST LONDON WATER (THAMES SUPPLY) BILL.

Preamble read a first time.

Counsel:—Mr. *Hope Scott* and Mr. *John Clerk.*
Agents:—Messrs. *Dorington & Co.*

Petitions against the Bill were read from:—

1. Vestry of St. Pancras.
   Agents:—Messrs. *Dyson & Co.*
2. Fulham District Board of Works.
   Agents:—Messrs. *Dyson & Co.*
3. Metropolitan and St. John's Wood Railway Company.
   Agents:—Messrs. *Dyson & Co.*
4. Regent's Canal Company.
   Agents:—Messrs. *Ellis & Ellis.*

5. Conservators of the River Thames.
   Counsel :—Mr. *Denison*, Q. C. and Mr. *Sargood.*
   Agents :—Messrs. *Wyatt & Metcalf.*
6. Vestry of Paddington.
   Agents :—Messrs. *Toogood & Co.*
7. Metropolitan Board of Works.
   Counsel :—Mr. *Cripps* and Mr. *Wilkinson.*
   Agents :—Messrs. *Dyson & Co.*
8. Vestry of Sunbury.
   Agents :—Messrs. *Burchell & Co.*
9. Sunbury Highway Surveyors.
   Agents :—Messrs. *Burchell & Co.*
10. Vestry of Kensington.
   Agents :—Messrs. *Martin & Leslie.*
11. Metropolitan Railway Company.
   Agents :—Messrs. *Dyson & Co.*
12. Richard Nicholson.
   Agents :—Messrs. *Dyson & Co.*
13. Tottenham and Hampstead Junction Railway Company.
   Agents:—Messrs. *Toogood & Co.*

The following Petitions were also read, but no parties appeared in support of the same.

1. Vestry of the Parish of Richmond.
2. Great Northern Railway Company.
3. London and South Western Railway Company.
4. John Fish Pownall and others.

EAST LONDON WATER (VARIOUS POWERS) BILL.

Counsel: Mr. *Hope Scott*, Q. C., and Mr. *John Clerk.*
Agents :—*Dorington & Co.*

Petitions against the Bill :—

1. Metropolitan Board of Works.
   Counsel :—Mr. *Cripps.*
   Agents :—Messrs. *Dyson & Co.*
2. Enfield District Local Board of Health.
   Agents :—Messrs. *Marchant & Paed.*
3. Tottenham Local Board and others.
   Counsel :—Mr. *Rodwell*, Q. C., and Mr. *Thomas.*
   Agents :—Messrs. *Fearon, Clabon & Fearon.*
4. Richard Hunt and Joseph Brisco Gamman.
   Counsel :—Mr. *J. J. Johnson*, Q.C.
   Agent :—Mr. *Henry Cruse.*
5. Samuel Richard Bosanquet and others.
   Agents :—Messrs. *Martin & Leslie.*
6. Richard Nicholson.
   Agents :—Messrs. *Dyson & Co.*
7. Trustees of the River Lea.
   Counsel :—Mr. *Rodwell*, Q. C., and Mr. *Pember.*
   Agents :—Messrs. *Marchant & Paed.*

The following Petitions were also read, but no parties appeared in support of the same :—

Corporation of the City of London.
Charles Bradlaugh.
William Delano.
Richard Hunt.
Philip William Mure and W. T. H. Strange.

The following Petitions, praying to be heard on the operation and results of "The Metropolis Water Act, 1852," were read:

Southwark and Vauxhall Water Company.
Grand Junction Waterworks Company.
Chelsea Waterworks Company.
West Middlesex Waterworks Company.
Lambeth Waterworks Company.

Agents:—Messrs *Sherwood & Co.*

New River Company.
East London Waterworks Company.

Agents:—Messrs. *Dorington & Co.*

Counsel for all the above Petitions:—Mr. *Hope Scott,* Q.C., Mr. *Denison,* Q.C., Mr. *Burke,* Q.C.; Mr. *John Clerk,* Mr. *Toulmin Smith,* Mr. *Bailey,* Hon. Mr. *Ashley,* and Mr. *Clay.*

Kent Waterworks Company.

Counsel:—Mr. *J. J. Johnson,* Q.C.
Agents:—Messrs. *Dorington & Co.*

Metropolitan Board of Works.

Counsel:—Mr. *Cripps,* Q.C., and Mr. *Wilkinson.*
Agents:—Messrs. *Dyson & Co.*

South Essex Waterworks.

Agents:—Messrs. *Dyson & Co.*

Trustees of River Lea.

Agents:—Messrs. *Marchant & Paed.*

Mr. *Hope Scott,* on behalf of the East London Water Bills, applied to the Committee to hear the case of the East London Water (Various Powers) Bill, before going into the general inquiry.

Room cleared; the Committee deliberated.

Resolved, "That the Committee will proceed with the East London Water (Various Powers) Bill on Monday, 20th May."

Parties called in and informed of the resolution of the Committee.

Mr. *Hope Scott* was heard on behalf of the London Waterworks on the operation and results of "The Metropolis Water Act, 1852."

Mr. *James Muir* examined.

[Adjourned to To-morrow, at Twelve o'clock.

Wednesday, 15*th May* 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Baillie.	Lord John Hay.
Mr. Headlam.	Mr. Sclater-Booth.
Mr. Kekewich.	Lord Frederick Cavendish.
Mr. Benyon.	Colonel Hogg.

Mr. *James Muir* further examined.

Mr. *Charles Greaves* examined.

[Adjourned to To-morrow, at Twelve o'clock.

Thursday, 16th May 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Benyon.
Lord John Hay.
Mr. Kekewich.
Mr. Baillie.
Lord Frederick Cavendish.
Mr. Headlam.
Colonel Hogg.
Mr. Sclater-Booth.

Mr. *Charles Greaves* further examined.

Mr. *James Simpson*, C.E., examined.

[Adjourned to To-morrow, at Twelve o'clock.

Friday, 17th May 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Kekewich.
Mr. Headlam.
Mr. Benyon.
Mr. Sclater-Booth.
Mr. Baillie.
Lord Frederick Cavendish.
Colonel Hogg.

Mr. *James Simpson* further examined.

Mr. *Joseph Quick* and Mr. *William D. Hack* were severally examined.

[Adjourned to Tuesday next, at Twelve o'clock.

Tuesday, 21st May 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Benyon.
Mr. Baillie.
Mr. Kekewich.
Lord Frederick Cavendish.
Mr. Headlam.
Colonel Hogg.
Lord John Hay.

EAST LONDON WATER (VARIOUS POWERS) BILL.

Mr. *Hope Scott*, on behalf of the Promoters, was heard in support of the Preamble of the Bill, and called—

Mr. *Charles Greaves*; sworn, and examined.

[Adjourned to Thursday next, at Twelve o'clock.

Thursday, May 23rd 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Baillie.
Mr. Kekewich.
Mr. Benyon.
Mr. Headlam.
Lord Frederick Cavendish.
Mr. Sclater-Booth.
Colonel Hogg.
Lord John Hay.

EAST LONDON WATER (VARIOUS POWERS) BILL.

Mr. *Charles Greaves* further examined.

Mr. *John Frederick Bateman*, C.E., and Dr. *Henry Letheby* were severally sworn and examined.

Mr. *Cripps* was heard on behalf of the Petition of the Metropolitan Board of Works against the Bill, and called—

Mr. *Joseph William Bazalgette*; sworn, and examined.

Mr. *Pember* stated, on behalf of the Petition of the Trustees of the River Lea, that his case was included in that of the Metropolitan Board of Works.

[Adjourned to Tuesday next, at Twelve o'clock.

Tuesday, 28*th May* 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Baillie.	Lord Frederick Cavendish.
Colonel Hogg.	Mr. Headlam.
Mr. Benyon.	Lord John Hay.
Mr. Kekewich.	Mr. Sclater-Booth.

EAST LONDON WATER (THAMES SUPPLY) BILL.

Mr. *Wyatt*, on behalf of the Conservators of the River Thames, applied to the Committee for an adjournment.

Mr. *Hope Scott* was heard against the application.

Mr. *Wyatt* was heard in reply.

The Committee determined against the adjournment.

Mr. *Hope Scott* addressed the Committee in support of the Preamble of the Bill, and called,

Mr. *Charles Greaves* (previously sworn); examined.

In support of the Petition of the Metropolitan Board of Works,

Mr. *Joseph William Bazalgette*; sworn, and examined.

[Adjourned to To-morrow, at Twelve o'clock.

Wednesday, 29*th May* 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Baillie.	Lord Frederick Cavendish.
Colonel Hogg.	Mr. Benyon.
Mr. Headlam.	Lord John Hay.
Mr. Kekewich.	Mr. Sclater-Booth.

EAST LONDON WATER (THAMES SUPPLY) BILL.

EAST LONDON WATER (VARIOUS POWERS) BILL.

Mr. *Cripps*, Q.C., addressed the Committee in support of the Petition of the Metropolitan Board of Works.

Mr. *Clerk* replied on behalf of the Promoters of the Bills.

Room cleared.—The Committee deliberated.

East London Water (Thames Supply) Bill.

Preamble read a second time.

Question, That the Preamble is proved,—put, and *agreed to.*

East London Water (Various Powers) Bill.

Preamble read a second time, and amended, by striking out the recitals having reference to provisions of the Bill as laid before the Committee, authorising the construction of certain drainage works.

Question, That the Preamble, as amended, is proved,—put, and *agreed to.*

Resolved, "That the Committee in passing the Preamble of the Bills, reserves the consideration of any amendments which they may deem it expedient to recommend in 'The Metropolis Water Supply Act, 1852.'"

Parties called in, and informed of the decision of the Committee.

East London Water (Various Powers) Bill.

Clauses considered:—

On Clause 34, Mr. *Pember* was heard to propose an amendment on behalf of the Trustees of the River Lea.

Mr. *Clerk* was heard in support of the clause.

Clause 34, amended, and *agreed to.*

Mr. *Pember* was heard to propose a clause on behalf of the Trustees of the River Lea.

Clause amended, and *agreed to.*

Adjourned till after the case of the East London Water Thames Supply Bill is disposed of.

East London Water (Thames Supply) Bill.

Clauses of the Bill considered, and *agreed to.*

On MS. clause on behalf of the Vestry of St. Pancras,

Mr. *William Booth Scott* and Mr. *James Brodbridge;* sworn, and examined.

Mr. *Charles Greaves* (previously sworn) examined.

Mr. *Durant Cooper* was heard in support of the clause on behalf of the Vestry of St. Pancras.

Mr. *Theodore Martin* was also heard in support of the clause on behalf of the Vestry of Kensington.

Mr. *Clerk* was heard against the proposed clause.

Clause amended, and *agreed to.*

Mr. *Cripps* was heard in support of clauses on behalf of the Metropolitan Board of Works, respecting Finsbury Park.

Mr. *Clerk* was heard against the clauses, and proposed an amendment.

Clause *agreed to.* Other clauses added.

Question, That this Bill be reported to the House,—put, and *agreed to.*

Ordered, to Report.

East London Water (Various Powers) Bill.

Mr. *Pember* was further heard in support of clauses for the protection of the Trustees of the River Lea.—Mr. *Clerk* was heard against the clauses.—Amendments made, M.S. clauses added.—Question, That this Bill as amended be reported to the House,—put, and *agreed to.*

Ordered to Report.

Monday, 3rd June 1867.

MEMBERS PRESENT:

Mr. Ayrton in the Chair.

Mr. Baillie.
Mr. Benyon.
Mr. Kekewich.
Colonel Hogg.
Lord John Hay.
Mr. Sclater-Booth.
Lord Frederick Cavendish.
Mr. Headlam.

Inquiry into the operation and results of the Metropolis Water Act, 1862, continued.

Mr. *J. J. Johnson,* was heard on behalf of the Petition of the Kent Waterworks Company, and called,

Mr. *William Richard Morris*; examined; Dr. *Henry Letheby,* recalled, and further examined.

Dr. *William Odling* and *Mr. Frederick Augustus Abel* were severally examined.

[Adjourned to To-morrow, at Eleven o'clock.

Tuesday, 4th June 1867.

MEMBERS PRESENT:

Mr. Ayrton in the Chair.

Mr. Benyon.
Colonel Hogg.
Mr. Kekewich.
Mr. Sclater-Booth.
Lord Frederick Cavendish.
Mr. Baillie.
Lord John Hay.

Mr. *Cripps* was heard in support of the Petition of the Metropolitan Board of Works, and called,

Mr. *John Frederick Bateman*; examined.

[Adjourned to To-morrow, at Twelve o'clock.

Wednesday, 5th June 1867.

MEMBERS PRESENT:

Mr. Ayrton in the Chair.

Colonel Hogg.
Mr. Baillie.
Mr. Benyon.
Mr. Kekewich.
Lord Frederick Cavendish.
Mr. Sclater-Booth.

Mr. *Alexander Ramsay,* Mr. *Henry Tomlinson,* and Captain *E. M. Shaw,* were severally examined.

[Adjourned to To-morrow, at Twelve o'clock.

Thursday, 6th June 1867.

MEMBERS PRESENT:

Mr. Ayrton in the Chair.

Mr. Benyon.
Mr. Baillie.
Lord Frederick Cavendish.
Mr. Sclater-Booth.
Mr. Kekewich.
Colonel Hogg.

Mr. *Edward Easton,* C.E., Mr. *Robert Rawlinson,* C.E., and Mr. *William Booth Scott* were severally examined.

[Adjourned to To-morrow, at Twelve o'clock.

Friday, 7th June 1867.

MEMBERS PRESENT:

Mr. Ayrton in the Chair.

Mr. Benyon.
Mr. Baillie.
Mr. Kekewich.
Lord Frederick Cavendish.
Lord John Hay.

Mr. *Denison* was heard in support of the Petitions of the Water Companies on the inquiry into the operation and results of "The Metropolis Water Act, 1852."

Mr. *J. J. Johnson* was heard on behalf of the Kent Waterworks Company.

Room cleared. Committee deliberated.

[Adjourned to Tuesday, 18th June, at Twelve o'clock, to consider Report.

Monday, 24th June 1867.

MEMBERS PRESENT:

Mr. Ayrton in the Chair.

Mr. Baillie.
Lord John Hay.
Colonel Hogg.
Mr. Headlam.
Mr. Sclater-Booth.
Mr. Benyon.
Lord Frederick Cavendish.
Mr. Kekewich.

Draft Report proposed by the Chairman, read as follows:

"1. Several companies having been established for the purpose of supplying the inhabitants of London with water, they began to enter into a competition with one another to obtain the supply of particular districts by offering low rates, and ruining their own affairs, until at length they entered into a combination to raise their rates. The inhabitants then complained so loudly of the conduct of the companies, that in 1821 a Committee of the House was appointed to inquire into the whole subject. This Committee made a very comprehensive report, expressing without hesitation their opinion that the supply of water to London was very superior to that enjoyed by any other City in Europe, and recommending that an Act should be passed to prescribe the maximum rates to be charged by the companies, and to enforce arrangements to prevent waste of water and other abuses. This report was followed by an ineffectual attempt at general legislation, after which the subject dropped, owing, no doubt, to the companies having avoided occasioning any new cause of discontent.

"2. In 1828 an alarm arose that the water then, with the exception of the New River supply, drawn from the tidal waters of the Thames near London, was so unwholesome as to be dangerous to health. A Royal Commission was in consequence appointed to ascertain the sources and means by which the metropolis was supplied with water, to determine the quality of the water, and to obtain information to suggest, if necessary, new methods or sources of supply; but the Commissioners were afterwards directed not to prosecute the latter inquiry. The Commission reported that the water of the Thames, when free from extraneous substances, was not unfit for domestic purposes or injurious to health; but as it approached the metropolis, it became loaded with a quantity of filth, which rendered it disgusting to the senses, and improper to be employed in the preparation of food, and considered that the supply was susceptible of, and required improvement. That many of the complaints respecting the quality of the water were well founded, and that it ought to be derived from other sources than those then resorted to, and guarded by such restrictions as should at all times ensure its cleanliness and quality.

"3. This report was subsequently referred to a Committee of the House of Commons, which in July 1828 made a report confirming the views expressed by the Royal Commission, and recommending that Mr. Telford the engineer should be instructed to proceed to the making of such surveys as he might think necessary, in order to enable him to recommend a practicable and efficacious plan of supplying the whole of the metropolis with pure and wholesome water.

"4. In 1834, Mr. Telford having been employed by Her Majesty's Government, in accordance with the Committee's recommendation, made a report advising that the northern part of the metropolis then supplied from the Thames, should be supplied from the River Verulam, and that the southern part should be supplied from the River Wandle. This report was referred to a Select Committee in 1834, which carried on a prolonged investigation, but in consequence of the lateness of the Session, merely reported the evidence to the House.

"5. The question was afterwards taken up by the House of Lords, who in 1840 appointed a Committee to take into consideration the supply of water to the metropolis, and to whom was referred the report of the Royal Commissioners of 1828, but this Committee also, after examining many witnesses, only concluded with reporting the evidence to the House.

"6. On an outbreak of cholera, attention was again drawn in 1849 to the quality of the water supplied to the metropolis. The Board of Health, which had been recently established, undertook to investigate the subject, and in the following year presented a report which entered very fully into all questions affecting the supply of water to the inhabitants of the metropolis. The Board proposed a new plan for obtaining a better supply by drawing it from gathering grounds in the Bagshot Sands, and in the district known as the Hind head, to the south of Guildford.

"7. In the same year a Bill having been introduced, bearing upon the supply of water from the River Lea, the report of the Board of Health underwent a severe scrutiny before a Committee of the House, and its conclusions were somewhat discredited. In consequence of this, the Government appointed a scientific commission on the chemical quality of the waters supplied by the companies, and of those proposed to be supplied instead.

"8. The Commission in 1856 came to the conclusion that the water then supplied to the metropolis exhibited no unwholesome qualities, that there were no sufficient grounds for believing that the mineral contents of the water were injurious to health, and that no reasonable doubt could be entertained of its salubrity; they recommended that the water should be protected from town sewage, and be filtered, and they condemned the proposed plan of the Board of Health.

"9. In 1851 Her Majesty's Government introduced a Bill to amalgamate all the companies then existing for the supply of the metropolis into one company, and to compel the new company to obtain water from such sources as the Secretary of State might direct, and otherwise improve the quality of the water. This Bill was referred to a Committee of the House, presided over by the late Sir James Graham. The subject was fully investigated, and it was ascertained that by proper and suitable arrangements, the defects which had been found to exist might be remedied, and that a sufficient supply of water of good quality might be obtained from the Valley of the Thames, and from the other sources from which the companies drew their supplies.

"10. Your Committee have thus briefly noticed the proceedings of the House before the passing of the Act of 1852, to show that the subject had been very fully considered, and that the House was in possession of the most complete information before it adopted the general policy prescribed by that Act.

"11. After undergoing some changes and modifications, the companies which had then secured for themselves the supply of water to the metropolis were as follows:—

> "The Chelsea Waterworks Company, the West Middlesex Waterworks Company, the Grand Junction Waterworks Company, the Southwark and Vauxhall Waterworks Company, the Lambeth Waterworks Company, all obtaining their supplies from the Thames;
>
> "The New River Company drawing its supplies from the Chadwell and Amwell springs, and from the River Lea, near Hertford;
>
> "The East London Waterworks Company drawing its supplies from the River Lea at and below Lea Bridge;
>
> "The Hampstead Waterworks Company drawing its supplies from springs and rain water at Hampstead;
>
> The Kent Company obtaining its supplies from Ravensbourne river near Lewisham.

"12. The chief provisions of the Metropolis Act of 1852, regulating the sources of supply, may be shortly summed up as follows:—

"After the 31st August 1865, the companies were prohibited from taking water at any part of the River Thames below Teddington Lock, or from any tributary stream at any part below the highest point at which the tide flowed. The reservoirs of all the companies within a direct distance of five miles from St. Paul's were to be roofed or covered over, unless the water should be subject to filtration after leaving the reservoir.

"All water was to be subject to filtration, unless drawn direct from wells into a covered reservoir for distribution.

"13. Considering the impressions that seem to pervade the minds of many persons that the present sources of supply are inadequate for the wants of the metropolis, your Committee have deemed it right to examine how far these provisions of the Act of 1852 have secured a sufficient supply of wholesome water for the metropolis, not only for the present time, but for many years to come.

“ 14. The Lambeth Company had already constructed works for the purpose of obtaining a supply at Thames Ditton. The Chelsea, West Middlesex, Grand Junction, and Southwark and Vauxhall Companies, in accordance with the provisions of that Act, shortly afterwards constructed works at Hampton, whence they have since drawn their supply. The nature and extent of the works constructed by each company are set forth in detail in the Appendix, No. 1, to this Report.

“ 15. In the construction of the works, the following sums were expended by the companies :

	£.
The Chelsea Company - - - - - -	
The West Middlesex - - - - - -	
The Grand Junction - - - - - -	
The Southwark and Vauxhall - - - - -	
The Lambeth - - - - - - - -	

“ From these works the five companies obtained an average supply of water daily in the year 1856, the first after the Act came into full operation, amounting to the following quantities :—

	Gallons.
The Chelsea Company - - - - - -	5,532,000
The West Middlesex - - - - - -	6,005,293
The Grand Junction - - - - - - -	5,478,361
The Southwark and Vauxhall - - - - -	10,531,122
The Lambeth - - - - - - - -	5,391,000
Total - - -	32,737,776

“ 16. The quantity of water drawn from the Thames has gradually increased since 1856 to the following extent in the past year :—

	Gallons.
The Chelsea Company - - - - - -	8,000,000
The West Middlesex - - - - - -	8,208,168
The Grand Junction - - - - - -	9,317,255
The Southwark and Vauxhall - - - - -	12,502,000
The Lambeth - - - - - - - -	8,950,000
Total - - -	46,977,228

“ 17. It is by no means easy to determine what may be the further requirements of the metropolis, which would mainly depend upon the growth of its population. The estimated number of persons now supplied by these companies is 1,369,090.

“ 18. But without pursuing a minute inquiry into the causes which may affect the increase of this population, it may be assumed that if it should double within the next 60 years, the supply of water which would then be required, at the present rate per head, would not exceed 100,000,000 gallons.

“ 19. It is, however, shown by the evidence given before your Committee, which they see no reason to doubt, that the smallest quantity of water known to flow down the Thames at the source of supply, in the driest time, exceeds 350,000,000 gallons in a day, and that the maximum flow in a time of flood exceeds twenty-five thousand million gallons, whilst the daily average flow in the dry season may be estimated at five hundred million gallons.

“ 20. If, therefore, at any future period the increase of population should render it necessary to make provision for a greater supply of water than could be conveniently drawn from the Thames in the dry season, it could be adequately made by storing up in reservoirs in the valley of the Thames a portion of the flood water, which now yields in a day a sufficient supply for a whole year.

“ 21. Your Committee have also examined how far the quality of the water of the Thames has been affected by the provisions of the Act of 1852 ; and they find that in 1856 an examination was made by A. W. Hofmann, professor of chemistry in the Metropolitan School of Science, and chemist to the Museum of Practical Geology, F.R.S., PH.D., LL.D., &c., and Lindsey Blyth, Esq., lecturer on natural philosophy at St. Mary's Hospital, who reported, amongst other things,—

> “ ‘ *A very considerable diminution, however, is observed in the amount of organic matter.*
>
> “ ‘ In fact, in 1856, the waters supplied to the metropolis contained not more than one-half of the organic matter which was present in the year 1851.
>
> “ ‘ This result is certainly not accidental. The diminution is not merely an average result, but uniformly observed throughout.’

" 22. Evidence has been laid before your Committee of a minute analysis of the water recently made, and which will be found in the Appendix, No. , showing that as far as chemical science and other means of comparison admit, the quality of the water drawn from the Thames has been fully maintained, and may be advantageously compared with the water generally supplied to towns in England.

" 23. It is right, nevertheless, to observe that chemical and other science entirely fails to detect the presence of impurities in water which, it is said, may exercise a prejudicial influence on the general health of the consumer, or even become the means of imparting specific disorder, though the presence of certain chemical substances may suggest a suspicion of other inappreciable impurities. It is therefore concluded that the only mode of securing water against these possible causes of danger is to prevent its being mixed with sewage or other known sources of contamination.

" 24. The Report on the River Thames of the Commissioners appointed to inquire into te best means of preventing the pollution of rivers, presented to the House by command, in 1866, sets forth in detail the numerous sources of pollution to which that river was exposed from the sewage of towns on its banks, and its tributaries. It is unnecessary to enter at length into this subject, as Parliament, by an Act passed in the last Session, and the House by a Bill passed in the present Session, has adopted such measures as are at present deemed practicable to avert the flow of the sewage of towns or other noxious matters into the river.

" 25. Your Committee, however, may remark that these measures do not extend to the tributaries of the Thames beyond three miles from their junction with the river; and that whilst the Water Companies directly, and the inhabitants of the metropolis indirectly, through them, contribute largely to the funds for the maintenance of the River Thames in a proper state, they are not represented on the Board of Conservancy of that river; that, therefore, those who have the greatest interest in seeing that the measures of the past and present year are properly carried into effect, are deprived of the opportunity of so doing. Your Committee recommend that some members of the Metropolitan Board of Works should be added to the Conservancy of the River Thames, to protect the water supply of the metropolis.

" 26. Your Committee are satisfied that both the quantity and quality of the water supplied from the Thames is so far satisfactory, that there is no ground for disturbing the arrangements made under the Act of 1852, and that any attempt to do so would only entail a waste of capital, and an unnecessary charge upon the owners and occupiers of property in the metropolis.

" 27. The New River Company continues to draw the water supplied by it from the River Lea and from the springs at Amwell, which afford a supply of about 4,000,000 gallons daily, and the East London Company from the same river.

" 28. The quantities of water supplied by the two companies in 1856, and the increase in 1866, were as follows:—

	1856.	1866.
	Gallons.	*Gallons.*
" The New River, from the Lea and the Amwell springs - - - - - - -	23,396,400	22,289,769
" The East London Company from the Lea -	14,562,684	19,380,739
TOTAL - - -	27,959,084	42,278,508

" Showing an increase of 4,319,424 gallons in the period of 10 years.

" 29. On the passing of the Act of 1852, works were constructed by the two companies in accordance with its provisioms. There has also been since constructed, by the New River Company, works for the purpose of intercepting the drainage of the town of Hertford, and passing it into the river below the point from which the New River is supplied with water from the Lea.

" 30. The East London Company has also constructed works for the purpose of obtaining a supply of water at Tottenham, higher up the Lea than the place whence it was formerly drawn, and has constructed a main drain for the purpose of intercepting the flow of sewage into the river between Tottenham and a point about four miles higher up the river called Ponder's End.

" 31. The New River Company has expended about 800,000 *l.*, and the East London Water Company about 700,000 *l.*, in effecting these improvements in their sources of supply, and giving effect to the provisions of the Act of 1852.

" 32. It is unnecessary to enter upon any inquiry into the fitness of the River Lea as a source of supply, as the Commission appointed to inquire into the pollution of rivers have recently issued a report on that river, which has been laid before the House by command.

" 33. The Commission have arrived at the conclusion that the extreme dry weather flow of water, down the river at Lea Bridge, is little above 40,000,000 gallons in each day of 24 hours, but as the New River Company draws its supply above this point, the whole daily flow of the Lea, in extreme dry weather, would be about 60,000,000 gallons. The average flow of water in the River Lea, in dry weather, is stated by a competent witness to be about 90,000,000 gallons.

" 34. Whilst, therefore, the river would admit of some increase in the supplies drawn from it by the two companies, any great addition to their present supply would entail upon them the necessity of constructing extensive reservoirs for the stowage of the water at other seasons of the year. An estimate was made by Mr. that reservoirs capable of holding millions of gallons might be constructed in the valley of the Lea for *l.* The expediency of these works has been questioned, and others have been proposed instead. Should the necessity arise for storing water in the Lea valley, there does not seem to be any difficulty in carrying out the requisite works.

" 35. Each of the companies is at present entitled to draw 22½ million gallons daily from the River Lea, and such further quantity of water as the river will afford, in equal moieties, at their respective sources of supply, but so as to leave sufficient water in the river for the purposes of navigation. The companies pay, in exchange for those rights, to the trustees of the river, a considerable amount, which is applied by them in the maintenance of the river, and of the navigation connected with it.

" 36. In consequence of the great increase in the supply required by the East London Company, and the disadvantages to which it is exposed in drawing water much below the service of the New River, it has already constructed a reservoir at Tottenham to store about 175,000,000 gallons; but the extreme dry season of 1864, as well as the events last year, to which we will presently advert, induced the company to apply to Parliament, in the present Session, to improve and increase their reservoir at Tottenham, so as to store 500,000,000 gallons of water. Your Committee have already reported in favour of the Bill for this purpose.

" 37. But it appearing that the water of the River Lea is liable at certain times to become so much contaminated as to be unfit to flow into the reservoirs, your Committee introduced a provision into the Bill, requiring the company to make such works in the channels of communication between the reservoir and the river as would allow the flow of water to be regulated from time to time, or cut off. The control to be exercised over these works will be explained in a subsequent recommendation.

" 38. But though these additional works would be sufficient to meet the immediate requirements of the company, they would by no means provide for the wants of the population of the eastern part of London for many years to come, should it increase in the ratio of the last 30 years.

" 39. The East London Waterworks Company has, therefore, also applied to Parliament, in the present Session, for leave to construct works to obtain a supply of 10,000,000 gallons daily from the Thames, and such of the flood water in addition as they may desire, for which they are to make an annual payment to the Board of Conservancy of the River Thames. Your Committee have likewise reported in favour of the Bill for this purpose, and they are satisfied that with this increased means of supply there will be an abundant provision of water for the inhabitants of the eastern part of London for many years to come, nor will this addition to the supply already drawn from the Thames materially affect the conclusions which have been already expressed, either as regards the present or the future, on the sufficiency of the Thames to satisfy the wants of the metropolis.

" 40. Your Committee will now consider the quality of the water drawn from the River Lea. The Report of 1856, already quoted, applied equally to the water supplied from that river, and your Committee having received scientific evidence of the present quality of the water supplied by the New River Company and the East London Company, are satisfied that, as far as chemical or other science affords the means of judging, the water is not only wholesome, but compares favourably with that supplied to other places.

" 41. It is, however, apparent, from the statements contained in the Report of the Royal Commission on the River Lea, that the main stream and its tributaries are subjected to a degree of pollution from the flow into them of sewage or noxious matters, more especially below the intake of the New River, that the water is exposed to great risk of becoming injurious to health by the infusion of matters which defy detection by scientific means. The Commissioners, in order to repress this source of danger, have submitted the following recommendations:—

> " ' That the charge of the entire water-shed of the River Lea be vested in a Conservancy Board, consisting of 15 members, to be appointed as hereinbefore mentioned.

" 'That the powers and property of the Lea Trust be transferred to the said Conservancy.

" 'That the Conservators receive powers to purchase the Stort Navigation, with a view to consolidate it with the navigation of the Lea.

" 'That after the lapse of a period to be allowed for alteration of existing arrangements, it may be made unlawful for any sewage, unless the same has been passed over land so as to become purified, or for any injurious refuse from manufactures or agriculture, to be cast into the River Lea, or into any of its tributaries, and that persons offending in this respect be made liable to penalties, to be recovered summarily.

" 'That it be incumbent upon the Conservators to see to the enforcement of the prohibitions that may be established against pollution of the river, and that for this purpose power be given to them to visit and inspect works, and, after due notice, to close the outlets of sewers, drains, and discharge pipes into the river or its tributaries.

" 'That, in the event of the funds derived from the navigation, together with the annual payments now made by the New River and East London Waterworks Companies, proving insufficient to meet the expenses of measures taken by the Conservators for the protection of the river from pollution, the said companies be called upon to contribute, in equitable proportions, such further sum as may be necessary, not exceeding a maximum to be fixed by Parliament.

" 'That powers be given to the Conservators to make embankments, and to drain and improve marsh lands, and carry out arterial drainage operations, the cost of such improvements to be met by a rate upon the properties so improved.

" 'That the Public Works Loan Commissioners be authorised to make advances to the Conservators upon such security as shall seem sufficient.

" 'That Legislative measures be passed to render it compulsory upon each company to supply water upon the 'constant system' throughout its district, and upon owners of houses to furnish their houses with proper arrangements to receive such supply.'

" 42. Whilst your Committee entirely concur in the purposes for which these recommendations are made, they are of opinion that some of them require reconsideration for reasons which they will briefly state.

" 43. By the Act for the regulation of the River Lea, passed in 1854, all the water of the river, subject to the jurisdiction of the trustees of the river, is vested in the two Water Companies, subject to the requirements of the trustees for the purpose of navigation, in order that the water may be used by the two Companies for the supply of the metropolis; and as under the provisions of this Act, large payments have been made and are annually contributed by the two Companies, which ultimately fall on the inhabitants who pay water rates, and as the consumers of the water have the greatest interest in its purity, your Committee are of opinion that for the purpose of protecting the interest of the inhabitants in any Board of Conservancy which may be constructed, they should be represented on the Board, by the nomination of members by the Metropolitan Board of Works. This may be accomplished without increasing the number of the Board, as there does not appear to be any reason why the Corporation of the City of London, which has no special interest in the matter, and is represented on the Metropolitan Board, should nominate two members as proposed by the Commissioners.

" 44. To improve the purity of the water of the Lea, plans have been submitted to your Committee for what are called comprehensive schemes for disposing of the sewage of the valley of the river, which, though imperfect, would require a large outlay. But as they would only collect the sewage into a considerable volume, rendering it more difficult to dispose of it with advantage at the place of outfall, your Committee are not prepared to recommend the adoption of these schemes.

" 45. Your Committee are of opinion that if each town or place were compelled to intercept its sewage, and to apply it to some adjacent land, the whole of the sewage of the towns on the River Lea and its tributaries, might be diverted from the river at a comparatively small cost, and with great agricultural profit. By these means each town would bear the cost and enjoy the advantages resulting from its own sewage; and as the quantity of sewage would be in proportion to the population, each place would be treated with an equal measure of justice.

" 46. Considering the amount already contributed by the two Water Companies to the funds of the Commissioners, and the larger expenditure of the metropolis, to effect its own drainage, and to dispose of its own sewage, so that it may not be an injury or even inconvenience to others, and that the Water Companies are assessed to the rates for this purpose, your Committee see no reason why they or the inhabitants of the metropolis should be called upon to pay the expenses of similar works carried on by other towns, for the purpose of preventing the sewage of those towns becoming injurious, or a nuisance.

" 47. On the recent outbreak of cholera in the east of London, it was ascribed by the Registrar General to the bad quality of the water supplied by the East London

Waterworks Company to a part of the East of London. Attention having in consequence been directed to the state of the company's works at Old Ford, they were subject to so much animadversion that the inhabitants at length applied to the Board of Trade to institute an inquiry under the provisions of the Act of 1852. The Board of Trade, in the month of 1866, appointed Captain Tyler to conduct the investigation. His report having been laid before the House, your Committee need not enter into this subject further than to notice the conclusions at which he has arrived. He reported that he was not prepared to go so far as the memorialists in asserting that the water was the principal, if not the sole, cause of the fearful mortality from cholera. He concurred in the view already expressed by the Royal Commissioners, that the River Lea is much contaminated by sewage before it reaches the company's works at Lea Bridge; that the company suffered from such contamination as well as the public, and they ought to receive, in the interest of a quarter of the population of the Metropolis, all the assistance that Parliament can afford towards its alteration. He was of opinion that the water of the Lea found its way into the covered reservoirs of the company at Old Ford, and that there was no doubt of the impure quality of that water; and he recommended certain works for the improvement of the reservoirs and filtering beds of the company.

"48. Passing by, for the present, other recommendations in Captain Tyler's report, your Committee express their entire concurrence in these conclusions.

"49. The Water Company, however, in anticipation of the result of the inquiry, introduced in their Bill, already noticed, provisions to enable them to improve their works at Old Ford, so as to guard against the pollution of the water supplied by them in future from their reservoir at that place; and as in the amended Bill reported by your Committee these provisions are made compulsory, the recurrence of the evils which have arisen will be prevented. As it appeared desirable that the East London Company should commence the works without delay, your Committee deemed it expedient not to delay these Bills until they had reported on the general questions referred to them, but to prevent any misapprehension from this course, your Committee recorded the following resolution:— To give effect to the views above expressed respecting the River Lea, your Committee recommend that a Bill should be introduced in the next Session, by the present Trustees of the River; but should they fail to do so, then that the duty should devolve upon the Metropolitan Board of Works.

"50. When the remedial measures thus recommended are carried out, the River Lea will be as free from the risk of contamination as the River Thames, and will afford a supply of wholesome water of unquestionable character to the East London Waterworks Company at the lower source of supply, as it now does to the New River Company, from its intake near Hertford.

"51. The North Kent Company, since the Act of 1852, has entirely abandoned the River Ravensbourne as a source of supply, and draws its water from deep wells sunk in the chalk formation on the south side of the Thames. In these works, of which a description will be found in Appendix No. 1. the Company has spent *l.*

"52. In 1856, the Company supplied on an average 2,340,000 gallons daily; it now supplies 6,150,000 gallons daily to a population of 237,068. It appears, from the evidence laid before your Committee, that the quantity of water which may be drawn from the wells now in use, and others which might be sunk, may be easily doubled. Your Committee are therefore of opinion that the Kent Water Company also possesses an adequate supply of water, both for the present, and for many years to come.

"53. With regard to the quality of the water supplied by this Company, no question has ever arisen. Though it appears from the analysis of it given in evidence that it contains a somewhat large per-centage of lime, yet the amount is comparatively small, and not such as to have any injurious effect on the health of the consumers.

"54. In concluding the remarks of your Committee on the character of the water supplied to the inhabitants of the Metropolis, it may be desirable to notice the scientific evidence on two other points which have created some prejudice against the quality of the water.

"55. It is stated that though the water supplied is somewhat hard from the presence of lime, it possesses in consequence the property of not decomposing leaden pipes or cisterns, whilst by boiling in the usual manner for domestic use, it loses the greater part of its hardness, and becomes as soft as any soft water which could otherwise be obtained.

"56. It is also stated, that the power of running water to purify itself is so great, that notwithstanding the quantity of drainage flowing into the Thames and the Lea, and their tributaries, these rivers, aided by the animal and vegetable life with which they abound, are capable of purifying their waters so as to render them perfectly wholesome when they reach the consumer, after undergoing the filtration to which they are subjected.

"57. However abundant or wholesome the water may be which the Companies are enabled to supply, the advantage which the inhabitants of the Metropolis can derive from it, nevertheless, depends upon the excellence of the arrangements by which they can procure it at all times of the day in the manner best adapted for every domestic purpose, as well as for all public objects; it is, therefore, necessary to inquire how far the Act of 1852, qualified by the other Acts relating to the supply of the Metropolis, has proved sufficient to attain this object.

"58. By the Act of 1852, every Company, after the 1st of July 1853, was to prepare a map of the district in which its pipes were laid, and was to cause to be marked on the map all existing mains and district mains, and from time to time all additions and alterations, so as to show the situation of all mains and district mains, and was to keep the maps for public inspection.

"On application of any person supplied with water, the Company was to furnish the particulars of the district main from which the applicant was supplied, and of the streets in which the district main was laid.

"After the 1st of July 1857, every Company was, on the requisition of four-fifths of the owners or occupiers of houses on a district main, to provide a constant supply of water, reaching to the top storey of every house, unless the Company could show that four-fifths of the houses on the district main were not properly fitted with apparatus for a constant supply.

"In case a constant supply should be thus provided, every person supplied was to provide a cistern with efficient apparatus, with other arrangements to prevent waste, and in case the person supplied should, after notice from the Company, fail to keep them in good order, the Company was to be at liberty to refuse or cut off the supply.

"All houses having constant supply were to be subject to inspection during the daytime.

"All domestic arrangements for receiving a supply of water were to be such as to prevent waste or misuse of water, or the flow of foul air or other matter into the Company's pipes; otherwise the water was not to be supplied.

"The Company is entitled to recover, by action or suit, any damage it may sustain from the wrongful acts of consumers, as well as cut off their supply of water.

"No communication pipes were to be laid by any person to the Company's mains without previous notice to the Company, and the Company was to be at liberty to make rules with the member of the Board of Trade to prevent misuse or waste of water; and to prescribe the nature of the apparatus and fittings to be used in houses, and, in the event of these rules being violated, the supply might be cut off.

"To ensure the provisions of the Act for a proper supply of water being carried out, the Board of Trade was empowered to appoint a person, from time to time, to inspect the works of the Companies, and to inquire into complaints; to adopt proceedings in Chancery to compel the Companies to do what was lawfully required of them, or to restrain them from doing wrong, and penalties were imposed upon the Companies for failing to comply with some of the provisions of the Act.

"There is also a further provision for the supply of water to the smallest class of houses, which will be subsequently noticed in connection with that question.

"The Metropolis, as defined by the Act of 1852, is somewhat more extensive than the Metropolis defined by the Metropolis Local Management Act of 1855.

"59. But as all the Companies are also subject to the General Waterworks Clauses Act, passed in 1847, it is necessary to advert to some of the clauses of that Act, which contains provisions relating to domestic supply, and is repeatedly referred to in the Act of 1852, in order to give a complete view of the law applicable to the Companies in general on this subject.

"60. The Act of 1847 provides that there shall be a constant supply of water to the inhabitants of the place, supplied to the top storey of every house, but the Metropolitan Companies are exempt from this clause, being subject to the Act of 1852 instead.

"The Companies are required to provide a supply of water to every owner or occupier who shall agree to take it for three years, and they are subjected to penalties for failing to supply water, except the default arises from frost, unusual drought, or other unavoidable cause or accident.

"The Companies are required, on demand of the owner of any house under 10 *l.* annual value, to lay down communication pipes, and other necessary works, for the supply of the house, if the Companies' pipes have been laid down in the street, and to charge a reasonable rent for the same, in addition to the authorised water rate, to be received in the same manner as the rate; the amount of rent to be settled by the inspector, or, if there be none, by two justices; for neglect a penalty is imposed on the Company, but if the rent is not paid, the Company is to be at liberty to remove the communication pipes and the works, at the expense of the owner, or at the expense of the occupier, to the extent of the rent of the houses.

"Provision is also made for the inhabitants laying down communication pipes, but from this clause the Metropolitan Companies are exempt.

"When the water is not constantly supplied under pressure, a cistern is to be provided by any person supplied with water, with proper apparatus to prevent waste, and in default the Company may cut off the supply.

Any person suffering a cistern or apparatus to be out of repair, so that the water may be wasted, is liable to a penalty not exceeding 5 *l.*

"The Company is empowered to enter houses in the daytime to inspect, and if obstructed to cut off the supply.

"There are penalties imposed on persons receiving supply, for improperly allowing other persons to use the water, on persons improperly taking water, and on persons wilfully or carelessly injuring or opening any apparatus of the Company whereby water may be wasted.

"There are also provisions for guarding against fouling the water of the Companies in any stream, reservoir, or aqueduct, or works of the Company, or in their pipes.

"From all the pipes where fire-plugs are fixed, the Companies are bound to provide a constant supply of water, for cleansing sewers and drains; for cleansing and watering the streets; for supplying any public pumps, baths, or washhouses established for free use, or paid for out of poor or borough rates.

"These special supplies are to be provided at such rates as may be agreed upon between the Company and the local authorities, or decided by an inspector, if there be one, and if not by two justices. This inspector is defined to be the officer appointed by the local authorities for the inspection of paving, drainage, or the supply of water in the district, alone or jointly with other districts.

"There are also provisions for the payment and recovery of the water rates, which are to be computed on the annual value of the tenement, such value, in case of dispute, to be assessed by two justices.

"The owners are liable for the water rate, instead of the occupier, for houses of less annual value than 10 *l.*; but in the Metropolis this limit is extended to 20 *l.* by the special Acts of these Companies alone.

"In the event of the water rate not being paid, the Company is at liberty to cut off the supply.

"The profits of the Company are restricted within the limit of 10 per cent. per annum, and if they exceed that amount a rateable reduction is to be made in the water rate.

"Penalties imposed within the Metropolitan police district are to be recovered and disposed of in the same manner as other penalties under the Metropolitan Police Acts.

"61. Each of the companies is, however, further regulated by its own special Acts, which contain provisions limiting the height to which the Company is bound to afford a supply; prescribing the maximum rates to be charged by the Company for water; and otherwise affecting the conditions under which the supply is to be given.

"62. It is now to be considered how far these several enactments have secured a proper supply of water to the Metropolis for domestic purposes.

"63. The difficulties of affording a full supply without waste are much greater than might be anticipated, and the difficulties of effecting a change from any system of domestic supply already established to another system are even greater. The subject is also beset with much confusion, which cannot be better illustrated than by the contradictory provisions in the Acts of 1847 and 1852. In the former the use of a cistern is not rendered obligatory where there is a contant supply of water to each house, but only when the supply is intermittent; in the Act of 1852 the use of a cistern is peremptorily made a condition of a constant supply.

"64. The Act of 1852 is so framed that the introduction of any constant supply depends upon its provisions relating to the preparation of plans, and the proceedings consequent thereon, but these provisions have been deemed too obscure and difficult of application to be carried into effect in a complete or satisfactory manner. With some trifling exceptions, therefore, the Metropolis is now supplied by the water being turned on for a short time in each day, except Sundays, and the occupiers are left to obtain and store as much of it as they may desire, or the condition of their houses will admit.

"65. The use of cisterns for the purpose of storing water for consumption is probably a more fertile cause of impurity than any pollution of the river from which the water is drawn. Decaying animal or vegetable bodies, or other impure matter, may easily find its way into a cistern, and is more likely to engender disease than any impurity existing in the water before it flows into the cistern. In well regulated houses the cisterns are, of course, constantly drawn dry, and properly cared for; but as cleanliness decreases, it is found that the cisterns are allowed to become more foul until the lowest state is reached, when the water is stored in tubs and otherwise, under the most disgusting conditions, which cannot but be injurious to health, and a cause of the diseases which are found to prevail in the worst regulated parts of London. On the other hand, an intermittent supply of water without cisterns not only deprives the inhabitants of the supply they ought to receive, but from the want of adequate storage it is kept in pails and other small receptacles, in rooms and places where it is liable to much contamination.

"66. For these and other reasons, which will be found in the evidence, your Committee have come to the conclusion that the Act of 1852 has failed to secure for the inhabitants the advantage which they ought to have long since enjoyed of a well-regulated supply of water in their houses for domestic purposes; your Committee therefore recommend that the Act should be amended by providing that there should be a constant supply of water to each house without any intermediate cistern, so that the water may be drawn direct from the company's pipes at all times during the 24 hours.

"67. It is right, however, to observe that this recommendation cannot be carried into effect unless adequate provisions are also made to prevent the waste of water which may arise from its being constantly laid on in every house. To determine how far water may be, and is, in fact, now wasted in the Metropolis, much evidence has been given which is deserving of notice.

" 68. The average supply of water per house and per head of the population in the Metropolis at the present time, exclusive of water for manufacturing purposes, for watering streets, and other public objects, is as follows:—

NAME of the COMPANY.	Gross Average Daily Quantity in 1866.	Quantity for other than House Supply.	Quantity for House Supply.	Number of Houses.	Quantity per each House.	Population, estimated at about	Quantity per head of Population.
RIVER LEA COMPANIES:	*Gallons.*	*Gallons.*	*Gallons.*		*Gallons.*		*Gallons.*
New River Company - -	22,898,769	4,361,965	18,536,804	109,198	169·75	800,000	23·17
East London Waterworks Company.	19,380,000	5,000,000	14,380,000	90,174	160 (nearly).	658,570	22 (nearly).
TOTAL drawn from the River Lea and the Wells of the New River Company -	42,277,769		32,916,804			1,458,570	
THAMES COMPANIES:							
Chelsea Waterworks Company -	8,000,000	1,193,000	6,807,000	26,900	253	201,000	33·86
West Middlesex - - -	8,208,168	556,000	7,652,168	36,500	210 (nearly.)	255,500	30· (nearly).
Grand Junction Waterworks Company (Michaelmas, 1866):							
Supplied to tenants - -	8,778,205	653,846	8,124,359	26,450	307	238,050	34·
Used for sand-washing, condensing, &c., at the Company's works.	538,850	—	—	—	—	—	—
Southwark and Vauxhall Water Company (Michaelmas, 1866)	12,502,000	3,076,712	9,425,288	66,530 2,215 2,235	$132\frac{3}{4}$	449,540	21·
			TOTAL -	70,980			
Lambeth Waterworks Company	8,950,000	1,251,000	7,699,000	37,203	207	225,000	34·22
TOTAL drawn from the Thames	46,977,223		39,707,815			1,369,090	
Kent Waterworks Company -	6,150,000	366,000	5,784,000	33,864	171	237,068	24·4
			78,408,619	- -	- -	3,064,738	

The discrepancies and difference in the supply of the several Companies will be found explained in the Table in the Appendix, No.

" 69. It has been ascertained by admeasurement, that the water consumed by the occupants of houses of the unwealthy classes does not exceed $6\frac{1}{2}$ gallons a day, a result which may be otherwise estimated as follows:

By the Ships Passenger Act, one gallon a day is provided for each passenger, which is deemed sufficient for food and limited ablutions. It appears by the evidence two gallons are sufficient for flushing a water closet, and the remainder may be regarded as sufficient for any other domestic purpose.

" 70. In the higher class of houses there is, of course, a much larger consumption from the use of baths and otherwise; but there is no reason to doubt that an average of 20 gallons a day per head is an abundant allowance for all domestic purposes, allowing for considerable, but perhaps unavoidable waste.

" 71. Comparing this with the quantity at present supplied, it would result as follows:—

	Gallons.
Present average supply daily - - - -	78,408,619
Present population at 20 gallons daily - -	61,294,760
Showing a daily waste at present of - -	17,103,859

" 72. From experiments made on several occasions in the Metropolis, it has been found that where the supply was suddenly changed from the present intermittent system, to a constant supply, without any alteration of the arrangements in the houses, there was an enormous waste of water. The experience derived from changes made from an intermittent to a constant supply in other towns, without suitable arrangements within the houses, leads to the same result.

"73. Your Committee have therefore endeavoured to ascertain the precise causes of this waste, and the means by which it may be obviated.

"74. With regard to the constant direct supply of water to a tap in the house, it appears that no waste is likely to occur if it be so placed and arranged that waste cannot take place without producing inconvenience, which will be immediately felt by the person permitting the waste, and that there are no real difficulties in fulfilling these conditions.

"75. All other modes of supply afford opportunities of waste, which it is not so easy to prevent. The ordinary cistern is so liable to occasion waste, that it has been found requisite to lead the waste pipe into some exposed position, when any flow from it can be immediately detected. It would, no doubt, be necessary to make this alteration when a cistern is maintained, but as it would be easy to substitute a direct service, without the intervention of a cistern, except for hot water services, no difficulty need be apprehended on this account.

"76. But with regard to the supply of water-closets, it has been shown that in consequence of the practice of allowing the water to flow through them uninterruptedly for long periods, instead of merely flushing them, they are a frequent cause of great waste, which cannot be detected; there appears, however, to be no difficulty in guarding against this by making such arrangements for flushing that the water cannot flow on continuously for an unlimited period.

"77. It has indeed been objected by some of the witnesses, that it will be found impracticable to maintain any flushing apparatus in proper order in houses frequented by the most negligent people, and that it would be better in these cases to leave them to draw water and flush with a pail.

"78. If this were a question affecting the individuals only, such an arrangement might be tolerated, but the health of the public being greatly concerned in the rapid removal of all matters which may either engender the forms of disease, for the most part infectious, found in ill-regulated habitations, or may tend to spread such disorders when they arise from other causes, Your Committee are of opinion that the introduction of a flushing apparatus where no water service now exists, ought to be imposed on the owner of every house, without prejudice to his right to recover the cost from the tenant, if the latter be under an obligation to incur the expense.

"79. The other special services provided with cisterns will be of a limited character, under conditions where the waste is not likely to be considerable, and it will be sufficiently guarded against by the arrangements recommended.

"80. It has also been objected by some of the witnesses that there is no remedy for one of the chief causes of waste in certain localities, which is to be found in the tendency of evil-disposed persons to take away all fittings of brass or copper.

"81. Your Committee have, however, been informed that it is not impossible to remove much of this temptation by reducing the present use of copper and brass in such fittings; but as the removal of the fittings undoubtedly causes great waste of water and loss to the companies, as well as great inconvenience and injury to the public, especially in case of fire, Your Committee are of opinion that the unlawful removal of fittings should be made a specific offence, punishable summarily with imprisoment, and that the sale of such fittings, if marked with some certain initial letters, should be placed under the same restrictions as the sale of stores with the mark of the Crown on them, by which the unlawful traffic in such fittings would be repressed.

"82. It has been urged by the water companies that a constant supply would endanger the pipes which have been laid down by the owners of houses between the house and the pipes of the company, called communication pipes; but as this would depend upon the arrangements which the company might think fit to make to regulate the pressure or height of the head of water supplied, which would involve much interference with the operations of the company, Your Committee recommend that all the communication pipes under the streets and pavements, up to, and inclusive of the stop-cock, if any therein, should be vested in the company, and that all future communication pipes up to and including a stop-cock, should be laid down by the company at its own expense, and that both those now and hereafter laid down should in future be kept in repair by the company; that it should be penal to use the stop-cock contrary to any rule of the company for cutting off the supply of water.

"83. The companies would thus be left free to make their own arrangements so long as they deliver a sufficient supply of water to the upper storey of each house within the limits of height which may be prescribed.

"84. It may be necessary to make an exception to meet the case of rows of houses of small value. It has been suggested by some of the witnesses that, for the sake of economy, these houses may be supplied by a small iron pipe, running through the houses, with a separate branch pipe and tap for each house. Your Committee recommend that in this case the companies should not be required to provide more than one communication pipe, with a stop-cock at the commencement of the through iron pipe; but it being impossible to define beforehand the occasions when this arrangement may be desirable, it should be left to the inspector to decide in each case in the event of disagreement between the owners or occupiers, and the company.

"85. Considering the improvements that are constantly taking place, both in economy and perfectness of construction in mechanical contrivances, and the difficulty of providing against inconvenience which may arise, Your Committee do not think it desirable that any precise mode of effecting a constant house supply, or any particular kind of apparatus, should be enjoined in a statute, but that the companies should be required, in conjunction with the Metropolitan Board of Works, to frame rules, with power to alter them in like manner, for the purpose of prescribing the arrangements within the house to carry out the general principles above noticed, and that any violation of these rules should be penal.

"86. To facilitate the application of these rules at the least possible expense and inconvenience to the owners and occupiers of houses, Your Committee recommend that the companies should be repuired to provide all the fittings and apparatus required by their rules, and keep them in repair at an established rate of charge, in estimating which due regard should be had to the fact that they would have to make a periodical inspection for their own protection at their own expense; and that when the fittings and apparatus are supplied by others, they should be put up in the prescribed manner, to the satisfaction of the water company, and that for this purpose patterns should be kept by the companies and by every local authority in the metropolis.

"87. The constant supply of water to each house thus recommended will no doubt entail upon the companies a watchful supervision on the internal fittings and apparatus, for which sufficient powers are contained in the Acts above noticed; but as they will be relieved of the trouble and expense of turning on the water, which they now have to do under the intermittent system, Your Committee do not consider that the companies have any valid objection or claim to indemnity on this account.

"88. But though every arrangement may be made, by the companies, assisted by legislation, for the proper supply of water to each house, experience has shown that it is absolutely necessary to invoke the aid of some constituted authority to ensure the inhabitants receiving it under such conditions as are essential for health, by enforcing a compliance with the provisions of any law which Parliament may deem requisite.

"89. The statutory provisions already made in this direction are in the following Acts:

"90. By the Act of 1852 it was provided that where it appears to the churchwardens and overseers of the poor of any parish that any house which can be supplied at the rate of 3 *d.* a week is without a proper supply, those authorities, with the consent of the vestry, may compel the owner or occupier to make provision for such supply, and that the water rate, not exceeding 3 *d.* a week, shall be paid by the owner.

"91. This provision, though not actually repealed, was virtually superseded by section 67 of the Metropolis Local Management Amendment Act of 1862. By this Act the vestries and district boards of the metropolis are empowered to compel the owners of houses to make such arrangements as are requisite for a proper supply of water, where the houses can be supplied at a rate not exceeding 3 *d.* a week, If the owner neglect to do the work, it may be done by the vestry at his expense. The water-rate is to be paid by the owner. By section 270 of the same Act, the local authorities are empowered to provide a supply of water for drinking fountains.

92. In case the supply to any house be insufficient, by reason of its being occupied by more than one family, the vestries and district boards are empowered to compel the owner to provide for a supply not exceeding 30 gallons a head daily; and in case the owner shall fail to fulfil the order for that purpose, the house is to be treated as an overcrowded dwelling; that is, the person permitting the overcrowding is to be liable to a penalty of 40 *s.*, and to a penal order from the magistrate to diminish the number of persons in the house.

"93. By the 81st section of the Metropolis Local Management Act of 1855, it is declared to be unlawful to erect any house, or to rebuild any house pulled down to a certain extent in the metropolis, without a sufficient water-closet furnished with suitable water and supply apparatus, or a privy furnished with suitable trapped soil pan, works, and arrangements necessary to insure the efficient operation thereof, under a penalty of 20 *l.*

"94. It is also enacted, that every house then built shall be provided with the like arrangements on the requisition of the vestry or district board, in case the same can be done without disturbing any building. But the local authorities may allow the continued use of a water-closet or privy, already existing in common, by the inmates of two or more houses.

"95. Under the Public Health Act of 1866, extensive general powers are conferred by sections 21 and 22, on the vestries and district boards, to prevent any nuisance, either from defective construction, or neglect of cleanliness; and, as regards the number of persons who may occupy a house, or part of a house, beyond one family, a power is conferred by section 35 to make rules for enforcing privy accommodation, and other appliances and means of cleanliness, in proportion to the number of lodgings. For the neglect of these rules penalties are imposed.

"96. By section 34 of the Act, all charges which the local authorities are entitled to have reimbursed from the owner of premises may, if not paid by him, be recovered from the occupier by compelling him to pay over his rent to the local authorities until the demand is satisfied.

"97. These various provisions of the law would seem to be ample for the purpose of ensuring a due supply of water for all purposes for the inhabitants of the metropolis in every house, but your Committee regret to state that they have hitherto failed to effect this desirable object, more especially in the cases where a proper supply of water is most essential.

"98. The Act of 1847 contemplated the appointment of inspectors for the purpose of securing an efficient discharge of the obligations of the water companies, but as the districts supplied by the companies are not conterminous with those under the jurisdiction of district local authorities, it is obvious that much inconvenience might arise from the independent action of several inspectors over the operations of each company. But the Metropolitan Board of Works, under the Metropolitan Building Acts, appoints surveyors for the purpose of enforcing compliance with those Acts throughout the metropolis, and as the surveyors are persons of skill, and have analogous duties to perform, they might be advantageously employed as inspectors for the purpose of seeing that houses are fitted with proper arrangements for the supply of water for all purposes. Your Committee therefore recommend that the Metropolitan Board should be required to cause an inspection of all houses, and a report to be made on all defects in the supply of water either for consumption or for water-closets or privies, and that the Board should be required to compel every house to be supplied with water and every privy with a flushing apparatus, as recommended in the foregoing part of this Report.

"99. Much unnecessary trouble and expense might be avoided if the surveyor were empowered to act as an arbitrator, and to decide summarily, on inspection, all disputes arising between the companies and owners or occupiers respecting the proper fittings of any water-supply apparatus, or its cost.

"100. Some incidental subjects remain to be noticed. Complaints may arise in certain localities that the water is not laid on to a sufficient height. It has been already observed that the companies have protected themselves in this respect by their Special Acts. It would require minute technical inquiry to determine whether the companies could be fairly compelled to deliver the water at any greater height where it is now proved insufficient, without incurring an expense, and subjecting other localities to an inconvenience, which would render a change impracticable. Your Committee, therefore, deem it better that such questions should be deferred until the Metropolitan Board shall have had an opportunity of examining into them, and communicating with the companies on the subject; but in the meantime the Kent Company, having admitted their ability to supply water at an elevation 100 feet higher than the limit at present prescribed for that company, the provisions of their Act should be amended accordingly.

"101. In applying the provisions of the Act, enabling the local authorities to obtain a supply for watering streets, some difficulty has arisen, and in one case it was proved that they were compelled to pay two-thirds more than the rate at which the company was required to supply water to an ordinary consumer; but when a constant supply is laid on there will be no reason why the local authorities should not be regarded as ordinary consumers, and be supplied at the same rate, and we recommend that the Act should be amended so as to leave no doubt on this point.

"102. The only question arising out of the water supply remaining to be considered is that for the extinguishment of fires. The law on the subject is to be found in several Statutes, beginning with an Act passed in 1774, by which the churchwardens of every parish within the bills of mortality, and other adjacent parishes, and the overseers of the poor when there is no churchwarden, were to make and fix, at the charge of such respective parishes, upon the mains and pipes of every waterworks within the parish, such fire-plugs and fire-cocks as they might deem proper.

"103. In 1865 the fire-engine establishment of the insurance companies having been transferred to the Metropolitan Board, all the powers of local authorities in the metropolis respecting fire-plugs were transferred to the Metropolitan Board exclusively, and the water companies were required to provide at the expense of the Board, in any mains or pipes, plugs, at such places, of such dimensions, and of such form as the Board might require, and ample power was conferred on the Board to use the plugs, as also to shut off any mains to increase the supply of water for the purpose of extinguishing fires.

"104. It has been represented to your Committee, on the part of the Metropolitan Board, that in consequence of the supply of water being intermittent, the inhabitants have not derived the benefit they are entitled to expect from this provision, and that in consequence of the plugs being unsuitable, the water cannot be at once discharged upon a fire without the intervention of an engine, as it otherwise might be. It would seem that when the supply is intermittent, the full pressure of the water at the particular time cannot be obtained until all the receptacles for water served by the main are filled, and the supply to them thus arrested, and that in order to obtain a full supply it is not merely necessary to draw the plug, but to understand the use of all the sluice cocks in the neighbourhood. These inconveniences would be entirely obviated by adopting the recommendation already made of a constant supply.

"105. With regard to the other ground of complaint, it appears that it is chiefly, if not entirely, owing to the Metropolitan Board having directed their attention to the most expensive instead of the least expensive mode of effecting their object; and your Committee have no doubt that as soon as the constant supply is in force, and the Metropolitan Board applies its energies to providing the simplest and cheapest form of hydrant, instead of a common plug, they will be able to throw the water directly from the company's mains, without the intervention of an engine, in sufficient quantity to arrest the progress of fires at their first outbreak.

"106. It has been urged that it is impossible to deal with the case of large buildings recently erected in the neighbourhood of small houses when the supply of water is inadequate for the purpose of extinguishing a great fire; but your Committee are of opinion that there is no difficulty in a main being laid down in such cases under the clause of the Act of 1847, which may be amended in this respect if insufficient.

"107. It is right to observe that the change of system recommended cannot be introduced at once throughout the metropolis, but each company must carefully examine and have put in order the fittings in the district supplied by a main, before the water is constantly laid on. To insure this being done in due time your Committee recommend that the Metropolitan Board should be empowered to direct, from time to time, within what period the constant supply should be introduced into each separate street; and to enable them to discharge this duty, each company should be compelled to furnish the Board with an exact copy of the plans now kept by it, with all the indications on it, showing all the mains, pipes, sluice-cocks, and communication pipes, as well as fire-plugs.

"108. It is remarkable that since the passing of the Act of 1852, there have been only three general complaints against the water companies respecting their supply of water made under its provisions. One against the Kent Company in 1860; another against the Southwark and Vauxhall Company in 1863, which was renewed in 1864, whilst the works to remedy it were in progress; and the third against the East London Company last year, already noticed. The absence of complaints is not to be ascribed to the want of cause of complaint on the part of the poorer classes, but to their inability to enforce them, to the supineness of those who might have known and have done better, and to the inefficiency of the provisions of the Act of 1852. It is no part of the legitimate duty of the Board of Trade to watch over the supply of water to the inhabitants of the metropolis. That duty should be performed by local authorities, with adequate facilities for receiving, and power for enforcing, the complaints of individuals. But as it is impossible to place the property and resources of the companies at the absolute disposal of the local authorities when they and the companies are unable to agree in any general measures to carry out the laws which determine the relative rights of the companies and the inhabitants, the dispute should be settled by arbitration.

"109. Your Committee therefore recommend that the duty of seeing that the water companies adequately fulfil their obligations, should be imposed upon the Metropolitan Board, who can be conveniently assisted in the performance of this duty by the surveyors of buildings, unless it be found necessary to appoint one or more persons in their stead, to act as inspectors for the whole metropolis; and that when questions arise between the Metropolitan Board of Works and the water companies, respecting the obligations of the latter, they should be determined by one or more arbitrators, to be nominated for the occasion by the Board of Trade.

"110. The law relating to the domestic supply of water in the metropolis being scattered through the two General Acts of 1847 and 1852 and the Local Acts of the companies, is by no means so clear as is desirable, Your Committee therefore recommend that the provisions of all the Acts on this subject should be repealed, and one uniform Act, in clear terms, and introducing the amendments suggested by the foregoing recommendations, should be substituted, which may be readily understood both by the inhabitants and the local authorities of the metropolis, as well as by the companies.

"111. Your Committee would willingly have avoided entering into the subject referred to them so much in detail. It would have been an easy task to have contented themselves with a few general recommendations, but, having found that in consequence of a disregard of details, the inhabitants of the metropolis have for 10 years been deprived of the benefits of a proper house supply of water, and that in no town in England a complete and satisfactory system of water supply for all purposes, without unnecessary waste, has yet been attained, your Committee have deemed it right to examine into the whole subject, in order that it may no longer be neglected."

Motion made, and question, "That the Draft Report be read a second time, paragraph by paragraph, put, and *agreed to.*

Paragraph 1, amended, and *agreed to.*

Paragraphs 2 to 10 inclusive, *agreed to.*

Paragraph 11, amended, and *agreed to.*

Paragraphs 12 to 14 inclusive, *agreed to.*

Paragraph 15, *postponed.*

Paragraphs 16 and 17, *agreed to.*

Paragraph 18, amended, and *agreed to.*

Paragraph 19, *agreed to.*

Paragraphs 20 to 25 inclusive, amended, and *agreed to.*

Paragraph 26, *agreed to.*

Paragraphs 27 and 28, amended, and *agreed to.*

Paragraphs 29 and 30, *agreed to.*

Paragraph 31, *postponed.*

Paragraph 32, *agreed to.*

Paragraphs 33 to 36 inclusive, amended, and *agreed to.*

Paragraph 37, *agreed to.*

Paragraph 38, amended, and *agreed to.*

Paragraphs 39 and 40, *agreed to.*

Paragraph 41, amended, and *agreed to.*

Paragraph 42, *agreed to.*

Paragraph 43, amended, and *agreed to.*

Paragraphs 44 and 45, *agreed to.*

Paragraph 46, amended, and *agreed to.*

Paragraph 47, *agreed to.*

Paragraphs 48 and 49, amended, and *agreed to.*

Paragraph 50, *agreed to.*

Paragraph 51, amended, and *agreed to.*

Paragraph 52, *agreed to.*

Paragraph 53, amended, and *agreed to.*

Paragraph 54, *agreed to.*

Paragraph 55, amended, and *agreed to.*

Paragraphs 56 and 57, *agreed to.*

Paragraphs 58 and 59, amended, and *agreed to.*

Paragraphs 60 to 63 inclusive, *agreed to.*

Paragraph 64, amended, and *agreed to.*

Paragraph 65, *agreed to.*

Paragraph 66, amended, and *agreed to.*

Paragraphs 67 to 70 inclusive, *agreed to.*

Paragraph 71, amended, and *agreed to.*

Paragraphs 72 to 74 inclusive, *agreed to.*

Paragraph 75, amended, and *agreed to.*

Paragraphs 76 to 80 inclusive, *agreed to.*

Paragraphs 81 to 83 inclusive, amended, and *agreed to.*

Paragraphs 84 and 85, *agreed to.*

Paragraph 86, amended, and *agreed to.*

Paragraph 87, *agreed to.*

Paragraph 88, amended, and *agreed to.*

Paragraphs 89 to 99 inclusive, *agreed to.*

Paragraphs 100 and 101, amended, and *agreed to.*

[Adjourned to To-morrow, at Ten o'clock.

Tuesday, 25*th June* 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Benyon.	Mr. Sclater-Booth.
Mr. Baillie.	Mr. Headlam.
Mr. Kekewich.	Colonel Hogg.
Lord Frederick Cavendish.	Lord John Hay.

The Committee deliberated.

Paragraphs 102 to 104 inclusive, *agreed to.*

Paragraph 105, amended, and *agreed to.*

Paragraph 106, *agreed to.*

Paragraphs 107 to 109 inclusive, amended, and *agreed to.*

Paragraph 110, *agreed to.*

Paragraph 111, amended, and *agreed to.*

Postponed paragraphs 15 and 31, amended, and *agreed to.*

MS. Paragraphs brought up, and added to the Report.

[Adjourned to Thursday next, at a quarter past Three.

Thursday, 27*th June* 1867.

MEMBERS PRESENT:

Mr. AYRTON in the Chair.

Mr. Benyon.	Mr. Sclater-Booth.
Colonel Hogg.	Lord John Hay.
Mr. Baillie.	Mr. Kekewich.

The Committee deliberated.

Draft Report, as amended, read.

Question put, "That this be the Report of the Committee to the House":—The Committee divided:

Ayes, 4.	Noe, 1.
Mr. Sclater-Booth.	Mr. Benyon.
Mr. Baillie.	
Mr. Kekewich.	
Colonel Hogg.	

Ordered, To report, together with the Minutes of Evidence, and an Appendix.

MINUTES OF EVIDENCE.

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MINUTES OF EVIDENCE.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Tuesday, 14*th May* 1867.

MEMBERS PRESENT:

Mr. Ayrton.
Mr. Sclater-Booth.
Mr. Benyon.
Mr. Henry Baillie.
Lord John Hay.
Mr. Headlam.
Colonel Hogg.
Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

THE following Petitions, praying to be heard on the operation and results of the "Metropolis Water Act, 1852," were read from— 14 May 1867.

The Southwark and Vauxhall Water Company;
The Grand Junction Waterworks Company;
The Chelsea Waterworks Company;
The West Middlesex Waterworks Company;
The Lambeth Waterworks Company.

Messrs. *Sherwood*, *Grubbe*, *Pritt*, and *Cameron* appeared as Agents for these Petitions.

The New River Company;
The East London Waterworks Company.
Messrs. *Dorrington* & *Co.* appeared as Agents for these Petitions.

The following Counsel appeared in support of all the above Petitions:—
Mr. *Hope Scott*, Q.C., Mr. *Denison*, Q.C., Mr. *Burke*, Q.C., Mr. *John Clerk*, Mr. *Toulmin Smith*, Mr. *Bailey*, The Honourable Mr. *Ashley*, and Mr. *Clay*.

The Petition of the Kent Waterworks Company.
No Counsel at present appeared in support of this Petition.
Messrs. *Dorrington* & *Co.* appeared as Agents.

The Petition of the Metropolitan Board of Works.
Mr. *Cripps* appeared as Counsel for the Petitioners.
Messrs. *Dyson* & *Co.* appeared as Agents.

14 May 1867.

The Petition of the South Essex Waterworks Company.
No Counsel at present appeared in support of this Petition.
Messrs. *Dyson* & *Co.* appeared as Agents.

The Petition of the Trustees of the River Lea.
No Counsel at present appeared in support of this Petition.
Messrs. *Marchant* and *Peed* appeared as Agents.

Mr. *Hope Scott* was heard to address the Committee, and called the following evidence:—

Mr. *James Muir*, called in; and Examined by Mr. *Burke*.

Mr. *J. Muir.*

1. You are the Engineer to the New River Company, are you not?—I am.

2. How many years have you been their engineer?—Between seven and eight years.

3. And I believe that you were in their service before you became their principal engineer?—I was for a number of years.

4. You are thoroughly well acquainted with all their operations for the last quarter of a century, are you not?—I am quite aware of them.

5. That company was established as long ago as the reign of King James the Second, was it not?—It was; and it was incorporated by Royal Charter.

6. The original promoter having been, as we know, Sir Hugh Myddelton?—He was.

7. What was the original scheme?—The original scheme was to bring water from the Chadwell spring, near Ware, in Hertfordshire, by an artificial channel.

8. At what distance from London?—About 20 miles.

9. The company, I believe, had never obtained any Act of Parliament until the year 1852, to the period of the inquiry, into the metropolitan supply?—Not until the year 1852.

10. What is the amount of capital which they have now expended on their works?—More than two millions and a half.

11. The exact figures, I believe, are 2,528,767 *l.*?—They are so.

12. *Chairman.*] Is that an open channel?—It is an open channel for the most part of the way, but it is covered for between two and three miles.

13. Mr. *Burke.*] I believe that the company have not exhausted their Parliamentary powers of raising capital?—They have not; they renewed them last Session by obtaining a new Act.

14. What extent of capital have they power to raise now?—They have now power to raise 3,000,000 *l.*

15. In addition?—No; 500,000 *l.* in addition to the capital originally named.

16. Have you any table of their profits for the last 46 years?—

The *Chairman* stated that the Committee would accept as evidence, the answers already sent in by the water companies; and that therefore it was unnecessary until those answers were questioned, to examine the witnesses on those particular points, except in so far as explanation and further detail might be required.

17. Mr. *Burke* (to the *Witness*)]. I do not think that you have given in a return of the profits?—I have a table of the dividends paid between the years 1821 and 1851, as returned to the Committee of the House of Commons in May 1852, and also the dividends which have been paid since.

18. Perhaps you will follow me while I read them. Your dividend in 1821 appears to have been $2\frac{1}{2}$ per cent?—It was.

19. In 1822 was it $2\frac{9}{10}$ per cent.?—It was.

20. In 1823 was it $3\frac{1}{4}$ per cent.?—It was.

21. In 1824 was it $3\frac{2}{5}$ per cent.?—Yes.

22. In 1825 was it $3\frac{9}{20}$ per cent.?—It was.

23. In 1826 was it $3\frac{1}{3}$ per cent.?—Yes.

24. In 1827 was it 3 per cent.?—Yes.

25. In 1828 was it $3\frac{3}{5}$ per cent.?—Yes.

26. In 1829 was it $3\frac{5}{8}$ per cent.?—Yes.

27. In

Mr. *J. Muir.*

14 May 1867

27. In 1830 was it $3\frac{3}{4}$ per cent. ?—Yes.

28. In 1831 was it $3\frac{3}{4}$ per cent. ?—Yes.

29. In 1832 was it $3\frac{9}{10}$ per cent. ?—Yes.

30. In 1833 was it $3\frac{4}{5}$ per cent. ?—Yes.

31. In 1834 was it $3\frac{9}{10}$ per cent. ?—Yes.

32. In 1835 was it $3\frac{7}{8}$ per cent. ?—Yes.

33. In 1836 was it $3\frac{3}{4}$ per cent. ?—It was.

34. In 1837 was it $3\frac{3}{4}$ per cent. ?—Yes.

35. In 1838 was it $3\frac{3}{4}$ per cent. ?—Yes.

36. In 1839 was it $3\frac{4}{5}$ per cent. ?—Yes.

37. In 1840 was it $3\frac{7}{8}$ per cent. ?—Yes.

38. In 1841 was $3\frac{9}{10}$ per cent. ?—Yes.

39. In 1842 was it $4\frac{1}{20}$ per cent. ?—Yes.

40. In 1843 was it $4\frac{1}{5}$ per cent. ?—Yes.

41. In 1844 was it $4\frac{1}{3}$ per cent. ?—Yes.

42. In 1845 was it $4\frac{3}{10}$ per cent. ?—Yes.

43. In 1846 was it $4\frac{1}{3}$ per cent. ?—Yes.

44. In 1847 was it $4\frac{1}{3}$ per cent. ?—Yes.

45. In 1848 was it $4\frac{3}{10}$ per cent. ?—Yes.

46. In 1849 was it $4\frac{1}{4}$ per cent. ?—Yes.

47. In 1850 was it $4\frac{1}{16}$ per cent. ?—Yes.

48. In 1851 was it 4 per cent. ?—That is so.

49. Then in 1852 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes.

50. In 1853 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes.

51. In 1854 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes.

52. In 1855 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes.

53. In 1856 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes

54. In 1857 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d* ?—Yes.

55. In 1858 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes.

56. In 1859 was it 4 *l.* 0 *s.* $1\frac{3}{4}$*d.* ?—Yes.

57. In 1860 was it 4 *l.* 0 *s.* $7\frac{1}{2}$*d.* ?—Yes.

58. In 1861 was it 4 *l.* 1 *s.* 1 *d.* ?—Yes.

59. In 1862 was it 4 *l.* 2 *s.* 11 *d.* ?—Yes.

60. In 1863 was it 4 *l.* 4 *s.* 10 *d.* ?—Yes.

61. In 1864 was it 4 *l.* 11 *s.* $9\frac{1}{2}$*d.* ?—Yes.

62. In 1865 was it 5 *l.* 8 *s.* $11\frac{1}{4}$*d.* ?—Yes.

63. In 1866 was it 6 *l.* 2 *s.* $2\frac{1}{2}$*d.* ?—Those figures are correct.

64. In 1866 I believe you appropriated a farther sum out of a reserved fund among your shareholders, did you not ?—We did.

65. How much per share did you give ?—£. 1,400 per share.

66. How much was that per cent. ?—£. 6 11 *s.* $6\frac{3}{4}$ *d.* per cent.

67. Those are the actual dividends which you have made during this year ?—They are.

68. What was the amount of water which last year you distributed in the metropolis ?—Nearly 23,000,000 gallons, on an average, per day.

69. Has that been an increasing amount, or not ?—It has been slightly diminishing year by year.

70. What was your supply in the year 1856 ?—The returns are printed from 1856 to 1866.

71. In 1856 was your average number of gallons 23,396,400 ?—Yes.

72. In 1857 was it 25,087,769 gallons ?—It was.

73. In 1858 was it 24,992,334 gallons ?—Yes.

74. In 1859 was it 24,988,151 gallons ?—It was.

75. Then in 1860 it goes back to 20,801,278 gallons ?—That was so.

76. In 1861 was it 22,837,000 gallons ?—Yes.

77. In 1862 was it 23,260,341 gallons ?—Yes.

78. In 1863 was it 23,834,673 gallons ?—Yes.

79. In 1864 was it 24,718,452 gallons ?—Yes.

80. In 1865 was it 23,496,866 gallons ?—Yes.

81. In 1866 was it only 22,898,769 gallons ?—Yes, those are the quantities.

82. *Chairman.*] Before you leave that point, will you explain what is the cause of this diminution in the supply by your company ?—It arises chiefly through a stricter supervision of the apparatus in the tenants' houses, securing greater care against waste.

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83. Mr. *Burke.*] While that diminution has taken place to the extent which you have shown, has your district absolutely increased?—It has.

84. Mr. *Headland.*] Has it increased in the number of houses upon it, or in the magnitude of the area?—In the number of houses, but also in the area to some extent; pipes have been driven further into the district, as houses have been built.

85. *Chairman.*] But your area remains the same, does it not?—The area over which the company have Parliamentary powers remains the same, but new houses have been built over it.

86. Mr. *Burke.*] Following up the honourable Chairman's questions, have you in any degree diminished the supply per head?—To the same extent.

87. You stated that this diminution of the general supply has been occasioned by superior fittings; I suppose preventing waste?—Preventing waste.

88. But practically, have you delivered to each consumer as much, notwithstanding those diminished quantities, as he heretofore consumed?—There has been no restriction whatever in the quantity which the tenants could take for actual use.

89. What would be the average amount per head?—Now it is between 28 and 29 gallons per head per day.

90. *Chairman.*] Do you mean that the supply has always been turned on for the same length of time during this diminution?—The supply has been turned on in every case, so as to fill all cisterns provided by consumers for their use, and it has been simply by preventing water from running away to waste in drains and otherwise, that this economy of water has been brought about.

91. But has the supply remained turned on to the houses for the same period of time in each day, and for every day in the week through the last 10 years?—The number of days during which the supply has been given in the week has been rather increased. Now it is every day, but formerly it was not so. It does not necessarily follow that the time for which the water was on each day is the same as before, but we always take care to leave the water turned on long enough each day to fill the cisterns of the houses supplied.

92. What is the rule in that respect?—That is the rule.

93. But what is the rule in point of time, in that respect, made by your company; what period of time in each day do you keep the water turned on?—It varies according to the circumstances of the street. In every case we leave the water on long enough to fill the cisterns in the houses of the street, that depending on the number of houses in the street, and the height of the cisterns in the street; but the general rule, which is applicable to every case, is this, that the water is left on long enough to fill all the cisterns in the houses in any particular street, and if, by stopping waste, the time can be made shorter, it is made shorter.

94. Mr. *Burke.*] But practically, the result which you state is, that you afford an average of about 29 gallons per head per day?—That is so.

95. I see that you have given the number of houses which you supply; what is your total estimated population?—Eight hundred thousand.

96. Can you give us any notion of the gradual increase of the number of houses in your district since the year 1856?—I can. In the year 1856 the number of houses supplied was 96,641.

97. Without going through the detail, what was it in 1866?—One hundred and twelve thousand nine hundred and sixty-four. There is just one point to be alluded to here, to explain the sudden rise in the number of houses in 1857. At that time the Hampstead waterworks district was incorporated with the New River Company's district, and hence there is a more sudden increase than appears in other parts of the table.

98. Do the alterations of the atmosphere, or of the weather, cause an increase or diminution in the supply of water?—They do.

99. In hot weather do you have to supply more?—Yes; we have.

100. More is used for watering streets, I suppose?—Yes.

101. Mr. *Headland.*] I see that you derive rents from watering streets, houses, and so on; have you any idea of what is used for domestic purposes?—We have returned to the Committee, approximately, those quantities.

102. Mr. *Burke.*] What is the general average amount which is considered by engineers to be sufficient for domestic supply per head?—For mere domestic

supply, I believe 10 gallons per head per day might be reckoned to be amply sufficient.

103. Taking the general supply, and estimating that by population, what would that give per head?—In some cases the supply has been given efficiently with only 15 gallons per head per day consumed.

104. *Chairman.*] Does that include the water-closets?—That includes the water-closets, and it includes also something beyond mere domestic consumption; there are towns where the supply has not much exceeded that amount for all purposes, domestic and non-domestic.

105. Mr. *Burke.*] But I suppose that in towns where water is used for trading purposes the supply of water would be very much increased?—Very much.

106. What have you found to be the general maximum in most of the towns in England?—I believe 20 gallons per day per head would be under almost all circumstances found a very sufficient supply.

107. Is the district which you supply a district which can be called in any respect a manufacturing district?—It is not by any means a large manufacturing district.

108. *Chairman.*] When you speak of this domestic supply, have you arrived at any knowledge of the domestic supply by investigation of what is actually consumed in the houses measured off, or is it merely the result of arithmetical calculation on the whole supply?—It has been arrived at by actual experiment; an experiment which I made some years ago on rather a large scale, in regard to the supply of houses of the class called model lodging-houses, showed that where persons had every means of using water, through the abundant cisternage provided, and waste prevented, the consumption was not quite seven gallons per head per day.

109. Then if we made a calculation, we ought to begin with the proper house supply, and consider all the rest of your supply as either for public purposes, such as watering the streets, or otherwise, or as waste?—The fact is, we have more accurate means of measuring the quantity of water supplied for trades and street watering and those purposes than we have for measuring the domestic supply; and, therefore, we have rather inverted the order you suggest. We take by reading our meters what quantity of water is delivered for trades and street watering and other purposes, and the remainder we reckon as going for domestic supply.

110. Is your remainder strictly confined to domestic supply, or does it include a number of miscellaneous objects which are not classified under public purposes?—I think what we term "domestic supply" in that return would include only what is delivered for drinking, cooking, water-closets, washing in houses, and probably for some private stables.

111. And nothing else under the head of domestic purposes?—Nothing else.

112. Mr. *Burke.*] You have shown us the increase of population in your district during the last few years; what has been the general rate of increase throughout London?—I believe that, according to the returns of the Registrar General, the increase of population has been 1·73 per cent. per annum.

113. That would amount to a doubling of the population in something like 40 years, would it not?—In about 40 years.

114. Have you found that in your district the increase of the population has gone on in that ratio?—Of late years the increase has been much less. It has been only about 1 per cent. in the New River district.

115. You have stated in your answer here the sources of your supply, and I need not ask you about that. Have you, in addition to your supply at the river Lea, springs at Hampstead and Highgate?—We have.

116. Do you use those for the purpose of domestic supply?—Not at all. Water is delivered from those ponds to separate mains for street watering chiefly, and for some other non-domestic purposes.

117. What quantity of water can you supply from your present available sources?—We have reckoned that we can supply more than 35,000,000 gallons per day.

118. Then supposing there to be a very large increase of population, you have a very large margin of supply to meet that want?—We still have.

119. To what extent?—To the extent of 12,000,000 gallons per day.

120. Are you now sinking any additional wells in the chalk basin?—We are sinking one now in the parish of Wormley, not very far from Cheshunt.

121. Have you made any estimate of the quantity of water that will be yielded by that well?—Only such estimate as is possible in the case of a well; judging from wells not very far off, I think we may count upon two and a half million gallons per day from that well.

122. Have you had any test of the water?—Not yet.

123. Mr. *Henry Baillie.*] Is that an Artesian well?—It is a well in the chalk; the water will not rise above the surface in all probability.

124. Mr. *Burke.*] Then I think you have the power of taking water from the Thames for street purposes, have you not?—We have, below Blackfriars Bridge.

125. That would be applicable, I suppose, merely for purposes of street watering?—And for sewers.

126. Not for domestic purposes?--Not at all.

127. Are you limited as to the quantity of water you can take from the Thames?—No; I can state that no water is now being taken from the Thames by the New River Company, or has been for many years, but they have that power still.

128. Then you not only have now more than sufficient water for your purposes, but you are sinking a well which, according to your estimate, will give you two and a half million gallons a day, and you have unlimited power for taking water for street purposes from the river below Blackfriars Bridge?—That is so.

129. Have you the means of creating or storing an additional supply of water from the basin of the River Lea?—We have.

130. To what extent, do you think, you might increase your supply?—It would be difficult to say exactly to what amount, but by the construction of a reservoir in the valley of the Lea there is no doubt water to be obtained in addition to that which the two Companies now derive from the River Lea. It was arranged by the River Lea Act of 1855 that, after each of the two companies drawing from the Lea had taken from it to the extent of 2,500 cubic feet a minute, they should store water, and then *pari passu* take as far as the Lea would allow them to take; and estimates have been made of the quantity of water in the Lea for store. It was reckoned, some years ago, that 90,000,000 gallons per day might be obtained in all on an average. There are certain very dry seasons when that average could not be reached; but I think it would not be unsafe to calculate upon 10,000,000 gallons per day for the New River Company, in addition to what is now taken by them from the Lea, and for that purpose store reservoirs would be necessary; and whenever the time comes for it the New River Company would be prepared to engage in such works.

131. In your judgment, by any improved system of fittings would there be any great economy adopted in the use of water?—No doubt there would.

132. By a better arrangement of the fittings, to what extent do you think your present supply would be reduced without injury to the public?—Nine gallons per head per day I think might be saved.

133. You have also reduced the supply by means of improved fittings without any inconvenience to the consumer, have you not?—We have.

134. In your judgment, may that improvement go on to a still greater extent in diminishing the waste of water?—I think so.

135. Colonel *Hogg.*] Is that as to the internal fittings to the houses?—The internal fittings.

136. Mr. *Burke.*] Then you do not view with apprehension the increase of the population of London within your district?—Not at all; because we have still a large margin giving us time to look ahead, and no doubt the New River Company would be quite prepared if they see any risk of shortness, to go forward in some new works, that would prevent any inconvenience.

137. Have you turned your attention to the affording of a constant supply instead of an intermittent supply?—I have.

138. Could that be done conveniently even in the present state of fittings in London?—Not as the fittings now are, and I can give an instance from actual experiments lately made in proof of that assertion, that with fittings as they are now, the consumption would be so much increased that the proper supply of the inhabitants would be quite impossible. Lately the New River Company placed upon one of their district mains a meter, and tried what the consumption of water

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water was under the existing intermittent system. It was then found to be something like ten gallons per head, and after a month's trial in this way, the supply was left on so as to be what is called constant. The result was that 16 times the quantity of water was taken under the constant system that had been taken under the ordinary intermittent system.

139. Have you any doubt that that increased supply went to waste, and was not consumed for any domestic purposes of the persons to whom it was supplied?—Undoubtedly.

140. So that under a system of constant supply there would necessarily be a much larger amount of waste than under the present supply furnished by the companies?—Unless the fittings are adapted for the constant supply system.

141. What would be the effect of introducing a constant supply with the present fittings?—The effect would be what I have described.

142. I am not alluding now to waste alone, but would the fittings be at all capable of sustaining or bearing that constant supply?—They would not, because in that very case, to which I have now alluded, of 121 houses on which the experiment was made, 18 of the lead pipes were burst by the additional pressure that took place at certain hours of the day, and various leakages occurred.

143. I suppose that under a system of constant supply a very close supervision would be necessary, on the part of the company, to prevent undue waste, would it not?—I may say, a very intrusive supervision would be needful to keep things in order, after they were put right in the houses.

144. Have you formed any estimate of the cost of adapting the fittings in London to constant supply?—I have in a rough manner, and I fancy that an average of 8 *l.* per house would be putting it moderately. Taking large and small houses together, it could not be less than 8 *l.* per house.

145. Taking that over the whole area of London, what would be the total expenditure?—You have a sum exceeding three millions of money merely for the purpose of adapting the apparatus of houses to the proposed constant supply.

146. Upon whom would that expenditure fall?—Upon the owners of house property.

147. Unless there was compulsion put upon them to do it, of course that would not be done?—I suppose they would be most unwilling to do it.

148. Have you found, generally speaking, that landlords are very willing to incur expense in fittings, or in improving fittings?—Quite the reverse.

149. Have you had experience of that?—We have.

150. Lessees for short terms of years, and occupiers, will hardly go to the expense of laying out large sums of money upon the landlord's premises?—It is not to be expected that they would.

151. Supposing it were left to the voluntary discretion of the landlords of London, do you think they will ever themselves call for a constant supply?—If they distinctly knew the expense that it involved, I think they would not.

152. What is the present mode of supplying water for extinguishing fire?—The mode in London is by the old fashioned wooden plug.

153. Would that be applicable in the case of a constant pressure for a constant supply?—Certainly not.

154. What would be the nature of the alteration requisite in that case in the event of a constant supply being required?—It would require the substitution of what is called a hydrant for the plug.

155. I do not know the exact nature of it. Is that a stand-up pipe?—There may be a stand pipe, or there may not be. It is a means of drawing water directly from the main by opening a sluice cock, instead of only drawing a wooden plug.

156. What would be the cost of altering the plugs into hydrants?—There are hydrants of cheaper descriptions, but the chief officer of the metropolitan fire brigade has recommended one which I think would cost not less than 12 *l.*

157. Taking the number of hydrants in your district, what would be the total cost of converting fire plugs into hydrants?—We have 14,000 fire plugs in the New River district; but a less number than 14,000 might probably be sufficient.

158. What do you think would be the total outlay requisite for substituting hydrants for fire plugs in your district?—The smallest estimate, I think, with the recommended hydrant would be 130,000 *l.* in the New River district alone.

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159. Upon whom would that expenditure fall?—Upon the Metropolitan Board of Works.

160. Under the Act of 1852 you can be called upon for a constant supply, can you not?—We can.

161. Upon the requisition of a certain number of inhabitants?—We can.

162. Have any such requsitions ever been submitted to you?—Never.

163. Will you be kind enough to explain what is meant by the words "main," and "district main"?—What the New River Company are in the habit of calling a main is a pipe constantly charged with water, and they are in the habit of calling those of their pipes which are intermittently charged, "services."

164. What is a district main?—I suppose it would be that which gives water to any part of the company's district which may be treated by itself.

165. Are they both always constantly charged with water?—All that we call mains are constantly charged with water.

166. Mr. *Headland.*] Which is the larger then, a district main, or a main?—I suppose the district main of that Act of Parliament is a smaller main than the great leading mains running through our district.

167. Mr. *Burke.*] I suppose that you necessarily have some very large mains and branch mains from them for the supply of the district?—We have.

168. Are those large and branching mains always charged through?—All mains are charged constantly.

169. Then we may assume that the word "main" will apply to that pipe of yours, which is always constantly charged, as distinguished from services which are intermittently supplied?—That is the usual acceptation of the word by the London water companies; but I do not know that that is the meaning of it in this Act; I think that it is this: according to the level of the ground, and the other circumstances of the district, some part of the district must be treated separately from another part, and it is said that if all in one particular locality are ready to take water without waste, the company are there required to leave water constantly on in the house.

170. *Chairman.*] What do you understand to be the definition of a district main?—What I have now explained is the best meaning which I can give to it; if any portion of the district can be treated separately from another portion of the district, we call it one district, and the main in it a district main.

171. Mr. *Kekewich.*] What is the diameter of your main pipes?—They vary from 5 inches up to 36 inches.

172. And the district main pipe is not so large in diameter, is it?—Not as the chief mains.

173. Mr. *Burke.*] Do you recollect clause 18 to this effect, that each company, upon the application of any person supplied with water by such company, shall furnish to such person the particulars of any district main from which such person is supplied, together with the names of the streets through which such district main passes, and the commencement and termination thereof; has that clause ever been put in operation in your district?—It has not.

174. Has any consumer ever applied to you to furnish him with the particulars of the district main by which he was supplied?—No.

175. That would probably be a preliminary step to calling on you for a constant supply?—Just so.

176. And that preliminary step has never been taken by anybody?—Never.

177. *Chairman.*] How would you make out such a map if you were asked to make it out?—It is from that clause that I have gathered the meaning of the phrase "district main" in the Act, because I fancy that the company alone can judge as to what portion of the district can be treated in that separate manner; and the main supplying that portion of the district, I suppose to be the main contemplated in that clause of the Act of 1852.

178. Mr. *Burke.*] You supply some houses on the constant system, do you not?—We do.

179. How many?—There are 1,200 altogether having a constant supply.

180. In those cases what precautions do you adopt to avoid waste?—One means is the application of meters.

181. Are there many meters in use?—Very nearly half that number of 1,200 have the supply protected by meters from waste.

182. Does the consumer pay according to the quantity of water registered by his meter?—He does in cases of trade supply.

183. In other cases they pay according to the rentals of the houses, do they not?—A per-centage upon the annual value of the house.

184. But where it is supplied by meter they pay upon the actual consumption?—A price per 1,000 gallons in the amount consumed.

185. In the houses where they use meters, do they use more or less water than in the houses where they pay by rate?—There are no meters for mere domestic supply. Those cases which I referred to where meters are used are cases of trade supplies.

186. Have you another means, called ferrule, for limiting the supply passing through the supply pipe?—Yes.

187. Will you explain that to the Committee?—It is merely a reduced orifice by which some limit is put to the extravagant waste which might take place if the pipe had the full bore throughout.

188. It is simply this; a very narrow pipe, through which only a limited quantity of water is running, but running constantly?—It is a narrowing of the pipe at its connection with the company's main. The limit in the New River district is not so close as to keep it down to the quantity which would be properly required in the house; it is considerably more than that.

189. Does this require any special superintendence?—Still superintendence is needed.

190. Then notwithstanding this precaution of limiting the orifice of the pipe, do you find that more waste occurs under the constant supply than under the intermittent system?—We do.

191. In Glasgow I think they have introduced a constant supply, have they not?—They have.

192. Have you any knowledge of the result of that?—The consumption in Glasgow very nearly reaches 50 gallons per head per day.

193. Have you any doubt that a very large proportion of the 50 gallons must be waste?—It is waste.

194. Do you know anything of the supply of Manchester?—Yes.

195. What is the system there?—It is constant supply.

196. Do you know whether waste has been complained of as regards the supply there?—I know, through the public papers, that waste has been a trouble to them in Manchester; for so recently as the month of January last an advertisement was inserted in the Manchester papers calling the attention of the inhabitants to the fact that great inconvenience arose from the waste that took place, and from the inability to supply the higher parts of the town because of the loss of water through waste in the lower parts of the town; and intimating that proceedings would be taken against parties who were found to continue after that notice the waste complained of.

197. Have you since you have been managing these works had many complaints made, either of the deficiency in quality, or in the quantity of the water supplied by you?—No.

198. Whenever a complaint comes in, is it recorded, and taken notice of immediately?—It is.

199. Then, in your judgment, are your consumers well satisfied with the quality and quantity of the water supplied by you?—I think so.

200. With reference to your charges, are they high or low as compared with the charges in other towns?—They are rather lower I think than in most towns.

201. What is the average per-centage upon the rental?—The average per centage is 4 per cent. per annum upon the annual value of a house.

202. And that you think is a lower average than the charge which is made in most other towns in the kingdom?—It is.

[The Witness withdrew.

The *Chairman* stated that he was desired by the Committee to intimate that the returns already made to the Committee would be accepted as the starting point for the evidence, and that nothing therein contained need be repeated, although, of course, there were several matters which required illustration and elucidation; and that the Committee would expect the Counsel for the Metropolitan Board of Works so to conduct their examination of the witnesses as to bring before the Committee all the grievances of the consumers of water in the metropolis.

Mr. *Cripps* stated that the Counsel for the Metropolitan Board of Works would obey the instruction of the Committee as far as possible, but that they were rather watching the inquiry with a view of making any suggestions which might occur to them upon the evidence.

The *Chairman* intimated that it must be understood that the inhabitants of the metropolis had left to the Metropolitan Board of Works the duty of protecting their interests. He also suggested to Mr. Burke that it would be desirable to obtain further evidence from Mr. Muir with reference to the sources of the water supply by the Commissioners of the River Lea, as to increasing the supply, and with reference to the storage of water.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Wednesday, 15*th May* 1867.

MEMBERS PRESENT:

Mr. Ayrton.
Mr. Sclater-Booth.
Mr. Benyon.
Mr. Henry Baillie.
Lord John Hay.

Mr. Headlam.
Colonel Hogg.
Lord Frederick Cavendish.
Mr. Kekewich.
Mr. Waldegrave Leslie.

ACTON SMEE AYRTON, Esq., in the Chair.

15 May 1867.

Chairman (to Mr. *Burke*).] The Committee have before them, and I suppose you have, a copy of the Report which has been recently issued as to the River Lea?

Mr. *Burke.*] Yes.

Chairman.] Have you a print of the evidence that was taken by the Commissioners?

Mr. *Burke.*] No, I have not seen it.

Chairman.] The Witness who was under examination yesterday was examined before that Commission, and I have a print of all the evidence that was taken by that Commission.

Mr. *Burke.*] We have not got that; but if there is any question that the Committee wish to ask Mr. Muir, I will put him into the box.

Chairman.] Mr. Muir was examined before the Commission, and what I was going to say was, that he need not repeat the evidence which has been already given.

Mr. *Burke.*] We do not know what it is.

Chairman.] It was mentioned yesterday evening, and it would be perhaps desirable if you could elucidate a little of the 21st page of the Report on the River Lea, in which it is stated, contrary to the evidence which Mr. Muir has already given, "With regard to the capability of the River Lea to meet the increasing demand for water supply in the eastern districts of London, the entire volume of water daily drawn direct from the River Lea amounts to 38,000,000 gallons, the New River Company drawing upon an average 18,000,000 gallons, and the East London Waterworks Company 20,000,000 gallons. In very dry seasons some difficulty is experienced by the latter company in obtaining their customary volume. It may, therefore, be taken that no dependence can be placed upon an increase of the supply from the river, without the construction of impounding reservoirs on a much larger scale than those now in existence." That appears to be at variance with the evidence given.

Mr. *Burke.*] You drew my attention to that yesterday, and Mr. Muir is here.

Mr. *James Muir*, called in; and further Examined by Mr. *Burke*.

Mr. *J. Muir*.

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203. THIS, I believe, is a map of the River Lea and its tributaries (*showing a map to the Witness*)?—Yes.

204. Will you lay that map before the Chairman, and then I will ask you one or two questions upon it (*the map being handed to the Chairman*).—That map indicates, I believe, the spot from which you take your water supply from the River Lea?—It does. This is the point (*pointing to the map*) at which the New River Company draw water from the Lea.

205. I believe you have executed works whereby you carry away all noxious water and sewage matter from the spot from which you take your supply?—Yes; we have.

206. You take water from a pure source?—Yes, from a comparatively pure source.

207. From that your works are constructed by yourselves independent of the River Lea, are they not?—Quite independent; the New River channel is an artificial channel, quite private, and protected from end to end.

208. The River Lea supplies the East London water also, I believe?—It does.

209. They take the water from the old channel, do they not?—Yes; from the natural channel of the River Lea.

210. You stated, yesterday, that you were sinking a well from which you expected to get two millions and a half of gallons of water a day?—Yes.

211. Will you point out to the Committee where that well is situate?—(*The Witness pointed out the same.*)

212. You further stated, I think, that you had an available surplus in the River Lea itself for a supply?—Yes, I did.

213. That available surplus, I suppose, is taken on the average quantity of water supplied down the river?—My calculation was made on the average.

214. That is to say, there are seasons in which there is a considerable amount of surplus running to waste, and there are dry seasons when the contrary would be the the case?—That is so.

215. You stated yesterday that in your judgment you had the means of making storage reservoirs which would contain an amount of water, giving you, I forget how many million gallons a day?—I mentioned roughly 10,000,000 gallons a day in addition to our twenty-two millions and a-half of gallons that the Company can take direct from the stream.

216. I suppose those storage reservoirs would be for the purpose of storing that water which, in flood time, runs to waste?—Yes; without them I could not get the 10,000,000 spoken of yesterday.

217. That is a very ordinary mode, is it not, of availing yourselves of the waste water?—It is.

218. Have you pointed out to the Committee where the storage reservoirs will be placed?—There are various sites in the valley of the Lea, on the eastern bank of the Lea, where reservoirs might be made, and the site marked on this map shows where almost all the flood water could be conveniently gathered below Fielde's Weir.

219. Are you cognizant of the levels in the neighbourhood to be able to state that fact?—The New River Company have not yet gone closely into the matter; the levels have not therefore been taken. I say that there is that possibility, when the time comes, of adding very much to the New River supply.

220. By having a storage reservoir, could you collect all the flood water that runs to waste now?—Yes.

221. Would that be also available for an additional supply to the East London Waterworks Company?—They might do the same thing.

222. That is to say, there is sufficient flood water, in your judgment, to make a large storage reservoir available for the two companies?—To a certain extent both companies may add to their supply by storage reservoirs.

223. You do not contemplate any such collection now, you having at the present time an ample quantity for the supply of your district?—Yes.

224. You suggest this as a means of providing for any deficiency which may arise from a great increase of population?—Yes.

225. May I take it that you view with no apprehension any large increase of population in your district, feeling satisfied that you have means of meeting the wants

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wants of that additional population?—I think it perfectly safe to say, that with the supply already at command, and that supply which may be obtained by means of storage reservoirs, the New River Company can safely go on for the next 40 or 50 years.

226. Are you cognizant of the evidence that has been given, and which has been referred to by the Chairman, as to a supply from the River Lea?—Yes; I have not seen the report, but I was examined as a witness.

227. You are prepared, I believe, to answer any question which the Chairman may wish to put to you upon that subject?—Yes.

228. With regard to what you have done yourselves for the purpose of completing your supply to the public, you have acquired various works belonging to other companies, have you not, from time to time?—From time to time we have.

229. The York Buildings Waterworks; did your company purchase them?—Yes; in the year 1818 the New River Company acquired the York Buildings Waterworks.

230. At what cost?—£.5,000 down, and an annual payment I think of 2,250 *l.* to the proprietors.

231. In 1822 you bought the London Bridge Waterworks, did you not?—Yes.

232. Giving them 3,750 *l.* a year?—Yes, in annuities.

233. Then, in 1855, I believe you bought the Hampstead Waterworks?—Yes.

234. Giving them 3,500 *l.* in the shape of annuities?—Yes, in annuities.

235. Under the provisions of the "Metropolis Water Act, 1852," and your own Acts subsequently passed, have you outlayed a large sum of money?—Yes; we have laid out probably 800,000 *l.*, more or less, directly connected with the Act of 1852.

236. Have you incurred a considerable outlay for deodorizing the sewage of the town of Hertford?—Yes; in the year 1854 the Company obtained powers to construct sewers throughout the town of Hertford; also to erect works for deodorizing the sewage there, and diverting the whole of it to a point below that at which they draw their supply.

237. Did that involve you still in an annual expenditure?—Yes, exceeding 600 *l.*

238. Have you also advanced money to the trustees of the River Lea for navigation works?—Under the Lea Act of 1855 it was arranged that a sum of 42,000 *l.* should be paid for navigation works and other purposes to the River Lea trustees, and an annual payment of 1,500 *l.*

239. Did you become liable to pay a considerable sum of money to the Ordnance Department?—Yes; 11,000 *l.*, I think, was the sum paid down to them.

240. For what object?—Because of the additional quantity of water which was taken from the Lea below Hertford.

241. Was that paid as compensation to the Ordnance Department?—Yes; it was paid because it was supposed to affect their mill power at Waltham.

242. I believe that in respect of one of the works which you bought, viz., the London Bridge Waterworks, you have received a sum of money back?—A payment was made from the City of London soon after the Company got that property, I think 3,000 *l.*; they bought back part of the property by payment of that sum.

243. And the Southwark Company also paid you some money?—Yes; a part of the district belonged to the Southwark Company; a payment was made by them.

244. With those exceptions, have you correctly stated the sums which you have paid in the purchase of the other works, and the large outlay you have incurred in order to comply with the provisions of the Act of 1852?—Yes; except a small sum which the East London Company pay as having had part of that same district.

245. They pay that to you?—Yes.

246. What is the amount?—£.160 per annum. I should mention in connection with the expenses incurred at Hertford, that the whole sum laid out there on works exceeded 26,000 *l.*

247. Do you mean upon the works for deodorizing the sewage?—Yes.

248. I think you stated that it cost 600 *l.* a year to maintain the works?—Yes.

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Cross-examined by Mr. *Cripps.*

249. Were you before the Committee of 1851-52?—No, I was not.

250. You know, however, I suppose, that the question of a constant or intermittent supply was a question a good deal gone into by that Committee?—Yes; it was very fully gone into.

251. Referring to the Act of Parliament founded upon that inquiry, of course you are aware of the 15th section?—Yes.

252. Has anything been done at all by your company upon or in consequence of that section?—Most of the large works executed by them under the Act of 1852, had reference to the whole subject of bettering the supply of water by filtration, and adding to its pressure, and by laying down larger mains, and preparing in some measure for a constant supply.

253. Section 15 is the section that directs, subject to the proviso in the latter part of it, that there shall be a constant supply of water?—That is the section.

254. So far as section 15 refers to a constant supply of water, nothing has been done by you under it?—Nothing has been done in the way of a memorial or application to the company to give a constant supply.

255. First of all, passing from the memorial for a moment, has anything been done by you under that section at all?—I suppose that the works I have alluded to had that as one of their objects.

256. You mean that those objects might have been contemplated if the 15th section had been then applied at all?—Quite so.

257. In point of fact, the 15th section has not been applied?—As we have had no application from any consumers to grant a constant supply.

258. We know the proviso to that section, and in point of fact, in practice, that proviso has over-ridden the section altogether, has it not?—No one has made application, whatever the reason of it may be.

259. You know that by that section in the first instance you are directed to give a constant supply of water; then there is a proviso that you shall not be bound to do that, except in a certain state of things, and that state of things has never arisen, you say?—It has not.

260. Therefore the section has been altogether inoperative?—It has.

261. Now, I will come to what the proviso is, and the meaning of it. You are aware that you are not bound to do it by the proviso, unless four-fifths of the owners or occupiers of the houses on a district main shall, by writing, under their hands, require you to give the supply?—Yes; that is one proviso.

262. Can you tell me practically about what number of houses there would be, if the consent of four-fifths of the owners or occupiers is to be given on any large district main?—I think I cannot; the circumstances vary so exceedingly, that, until a case arises, we cannot have an opportunity of counting the number, and the answer you require I can hardly give.

263. Can you give me no idea?—No.

264. Let me try to get some description of what they would be; they are to be the owners or occupiers of houses upon a district main?—Yes.

265. Supposing you are speaking of a main apart from a district main, is that always kept charged with constant pressure?—What we call mains are always charged.

266. Then it would be one great distinction between a main and a district main, that a main is always charged, and a district main is intermittent?—We are not in the habit of calling a pipe that is intermittently charged a main at all.

267. But somebody has done so in the Act of Parliament; there we have a main and a district main; your main is always kept charged as I understand?—Yes.

268. Is the district main which is alluded to in the section, something that is not always kept charged?—I think not necessarily; I can understand that what we call a service, or branch pipe intermittently charged, may be in some cases looked upon as a district main when it comes under the constant supply system.

269. Am I to understand that you, on behalf of the company, cannot tell us what they understand by a district main?—The best definition I think, was the one that I attempted to give yesterday, that a district main is a leading pipe, I will say, through a portion of the company's district, which could be treated by itself, having regard to its levels.

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270. That is where a district main joins the main that might cut off the water, leaving the main charged and cutting it from the under district main?—No; I think you assume that the definition of district main is a main that now is or may be intermittently charged.

271. Will you just attend to that definition, and see whether it is correct; where a district main joins the main, there is a point where you could cut off the water from the district, but leaving it in the main?—It might be so.

272. Then in point of fact the company has the control of what would be district mains, and they could make the district mains as long or as short as they pleased, and so regulate the supply?—They might.

273. And therefore they regulate the number of inhabitants that would be in any place supplied by any one district main?—Circumstances would regulate it.

274. But the company could do it, could they not?—No; I think circumstances must regulate it, and not the company, because the extent to which one main may be reckoned the supply artery of a particular district depends, not upon the will of the company, but upon the nature of the district as to levels, &c.

275. Do you in point of fact keep any mains charged constantly, which would come under the definition of district mains, and which might be cut off from the mains?—Yes; many.

276. Would the parties who communicated with such district mains, in such a case have a constant supply?—Yes; if they complied with the conditions of that supply.

277. If you did not cut off the water from it, there would be constant pressure?—Yes.

278. Then those parties having service pipes would have constant pressure?—Yes; if they had service pipes from it, but they have not now.

279. You have stated that you found that the landlords were very unwilling to incur any expense of this kind?—Yes; they are very unwilling to do so.

280. And the tenants, having short terms, are equally unwilling?—Yes; more so.

281. If neither the landlords nor the tenants, nor the company, are to supply the necessary apparatus, how is constant pressure ever to be given?—That is just our difficulty.

282. Can you suggest any other way in which it can be given, except in some way by one of the three parties?—There is no way by which it can be given without that large outlay, which, as referred to yesterday, must be borne by the landlords, or the owners of house property, preparing their houses to receive a supply without waste, or, at all events, with inconsiderable waste.

283. Do you contemplate that Section 15 will always remain inoperative as it has been?—Judging from the past, I would.

284. In point of fact, the section is a nullity?—I do not think so; but the difficulties in London are such, that is impossible to carry out a constant supply system without incurring that great expense which it is found landlords will not go to.

285. It comes to this, does it not, that the section will, in your opinion, be a nullity?—Yes.

286. Assuming that fittings are to be put into the houses, then the company would benefit by their being of the best description, in order to prevent waste?—No doubt; having the waste stopped would be a benefit.

287. You have a direct interest, have you not, assuming constant pressure to be applied in the fittings of the houses being as good as possible?—Yes.

288. In proportion to that, the waste would be diminished, would it not?—Yes.

289. Do you think it would be fair, under those circumstances, that you should contribute nothing towards that expense or not?—I think, as the benefit we should receive would be rather in the way of a safeguard against the extra consumption which we would be subjected to by a constant supply, the company ought not to be subjected to such expense.

290. Upon whom do you think the expense ought to fall, upon the tenants or the landlords?—The tenants certainly are immediately benefited, but the property being benefited also, the landlords are the persons to whom we should naturally look for incurring any expense of the kind.

291. Your opinion is then, as representing the company, that it should be an expense to be divided between the tenant and the landlord?—Yes; if the tenants

would consent to share in that expense, but I very much fear that you would find a difficulty in getting them to incur any part of that expense.

292. Unless something is done by the company, or some compulsion is put upon tenants or the landlords, you do not anticipate it will ever be done?—I think not.

293. I see that Section 16 follows upon Section 15, and, of course, Section 15 having failed, nothing has been done under Section 16?—No.

294. Has any application been made to you under Section 18?—None.

295. Section 17, I take it, refers to the same matter?—I think it does.

296. I suppose I may say that Sections 15, 16, 17, and 18 have been inoperative?—

Mr. *Burke.*] No, you had better ask the question. They have prepared maps?

Witness.] Yes; the maps we have prepared, but no application has been made to see the maps.

Mr. *Cripps.*] The application will be with reference to the constant supply of the inhabitants on the main, that is, under the 15th section.

Chairman.] Is that your reading of the sections?

Mr. *Cripps.*] Yes, that Sections 16, 17, and 18 are modes of carrying out and aiding Section 15.

Chairman.] Section 17 says that, "Every company shall, within one year after the passing of this Act, cause a map to be made of the district," &c., and Section 15 says, "After the expiration of five years from the passing of this Act every company shall," &c. How can a section which says what shall be done in one year after the passing of the Act, have reference to a section which says what is to take place five years after passing of the Act?

Mr. *Cripps.*] It seems inconsistent, but at the same time the place in the Act where that section occurs would seem to point to its object. Section 18 follows upon that.

Witness.] The company have regarded that section that you refer to as a thing necessary altogether, irrespective of the constant supply requirement.

297. Yes; but, independently of the constant supply, has any use been made, or anything been done, under Section 17?—Yes; the maps will be very useful on application by the parties for a constant supply, but they are useful for other reasons too; they have been very useful to the company themselves; in fact, they have been indispensable in regard to works which have been carried out—railway interferences and others.

298. For your own purposes, you have found the convenience of Clause 17?—Yes, and for public purposes also.

299. The public have not applied for any inspection of the maps under Section 17?—Not for the purposes of a constant supply, but applications have been more frequently made for a reference to our maps, when public works have been made by public bodies, and that has been freely allowed.

300. *Chairman.*] Have you not made any maps under Section 17?—We have; and I can show specimens of the maps. I may call that a district main (*pointing to a map*). If we are applied to by any resident in this locality (*pointing to the map*) as to his district main, we refer him to the map; and in this case I may point out that that portion of the line of pipes (*pointing to the map*) might be called a district main.

301. That is, everything connected from that point (*pointing to the map*); all the flow from that point?—Yes.

302. What would you do here in this street (*pointing to the map*)?—This main (*pointing to the map*), terminating in a point here, might be called a district main.

303. Mr. *Cripps.*] Now, as to Section 17. You will observe that "district mains" are first introduced into Section 15, and those are the same terms that occur in Section 17; and I apprehend that that section was intended to have reference to Section 15, and it is followed by Section 18.

Chairman.] Section 17 requires them to make a map within one year after the passing of the Act, to show all the existing mains and district mains; and then, four years after that, Section 15 comes into force. I wish to correct the error that you have fallen into, that Section 17 was the consequence of Section 15. Section 15 is rather the consequence of Section 17

Mr. *Cripps.*] I think it does come to that.

304. (To the *Witness.*) You know, I suppose, that the constant pressure system has been applied in a great many other towns?—Yes.

305. Whatever difficulties there may be as to waste would, of course, apply the same in one place as in another?—Not always.

306. The mere fact of the waste, or the necessity of preventing it, would apply, would it not, wherever the constant pressure system exists?—There is much greater liability to waste in some places than in others, arising from various circumstances; towns that are well supplied with drains and with water-closets, and means of waste with great ease are much more difficult to deal with than towns where water-closets are rare, and where blocks of houses are supplied probably by one tap, instead of having cisterns or taps upon nearly every floor.

307. There might be more care to prevent waste in some cases than in others?—A great deal more care.

308. Do you know how long the constant pressure system has been in operation at Manchester?—I suppose since 1852, but I am not sure. I believe Manchester to be a very different place, however, in some of these respects that I have named, from London. I mean as to the number of water-closets and drainage.

309. Do you know how long that system has been in operation in Glasgow?—Since the Loch Katrine water was brought to Glasgow.

310. *Chairman.*] Are there not a number of places where there is a constant service?—Yes, there are a number of places where there is constant service.

311. Mr. *Cripps.*] You mentioned that the cost of an alteration of the system would be considerable; in the case of a new house, what would be the least cost?—In the case of a new house, instead of extra outlay a saving would be effected with a constant supply.

312. That is to say, the constant pressure system would give a saving?—Yes, in this respect; if the constant system is carried out, as many advocates of that system would have it, without cisterns, and with pipes of very small diameter, the saving in new houses would be something, I think. I should say it must be admitted that there are certain advantages with the constant service system, advantages which the New River Company would be willing to admit, and that might be one of them; if it was carried out in the case of new houses, there would be some saving to the consumer in providing for it, and also this advantage in not having a cistern, that as cisterns in certain cases are liable to be polluted by contact with foul air, they would not, under the constant system, be under that liability. But on the other hand, the disadvantages of being without cisterns are so great that when the matter was fully considered before the Committee in 1852, it was made part of the requirements of that Act that in all cases where constant service in London was given, cisterns should be provided; and a very wise provision in almost all cases it would be.

313. Do you mean under Section 15?—No, under Section 22.

314. Mr. *Headlam.*] How would that affect the question of damage to the pipes by the water freezing?—The liability to damage by freezing I believe to be greater under the constant system than under the intermittent system.

315. Mr. *Cripps.*] Section 22, like the other sections, has never come into operation, because the constant pressure system has not come in; is that so?—Cisterns are already provided under the intermittent system which exists.

316. Section 22 begins in this way: "Whenever water shall be constantly laid on under pressure in any district main;" then the section follows upon that?—That is the section requiring cisterns under the constant pressure supply that was then proposed for London.

317. Whatever it is, it is a section that has not come into operation?—That section certainly has not come into operation; but a similar section in the

Special Act of the Company requires the same thing under the intermittent system.

318. To go to some of the other sections, for instance, Section 20, where the provisions of the Act have been violated, and application is to be made to the Board of Trade, nothing has been done?—Nothing.

319. With reference to the purity of the water, how does any individual act, or how can he act who imagines rightly, or wrongly, that the water is impure?—I suppose that the first step will be to complain.

320. Is there any individual right to complain, or must a person be one of 20, and then apply to the Board of Trade?—I think that if there were any real complaint to make, he would soon be able to find 20 persons to join him in a memorial of the kind.

321. That is the remedy that you suggest as the proper one, that he should get others to join him?—I think it would be an easy remedy, and apparently a very sufficient one.

322. If there was any real ground of complaint?—Yes.

323. Would it be reasonable that there should be some Board, or some authority, or some party appointed impartially, to whom the matter could be at once referred, to test it?—There is such a body in the Board of Trade.

324. Should you be opposed to any more simple remedy being provided, or object to any individual being appointed with authority, to whom the matter could be referred at once?—I think not, but practically the Board of Trade do refer it to their inspector, and therefore virtually it is left in the hands of an individual, as things are at present.

325. In your opinion, no further or more simple remedy is required?—I think not.

326. I believe considerable alarm does arise in the minds of persons from the idea that water is impure, whether rightly or wrongly?—I do not think it has existed in the district with which I am connected, although many things have lately been said and written to create alarm of that kind.

327. In your company you have had no particular instance brought to your knowledge?—None at all.

328. You stated yesterday, in answer to my learned friend, that the supply of water which you had to give had diminished, although the number of houses that consumed it had increased?—Yes.

329. You gave the increase in the number of houses, which I think was 16,000?—We now supply more than 112,000, but I gave in a table yesterday.

330. It is the difference between 96,000 and 112,000, which is about 16,000 more houses that you supply than you did?—Yes; during the period referred to.

331. What has been, while the increase in the number of houses has been 16,000, the entire diminution of the water?—I made a return of that also yesterday; but taking the highest number you had for an earlier period that for the present time, which is nearly the lowest number, the difference must be something like two millions of gallons a day.

332. That is less?—Yes.

333. Do you attribute that saving entirely to improved means of preventing waste?—Entirely, as there has been no restriction put upon the quantity of the water which consumers use.

334. Can you tell what the benefit to the company has been from these means, whatever they are, of diminishing the waste; has it been very considerable?—It has been considerable, although the suppression of that waste has cost us a very large annual outlay, and it is very hard to say whether the annual outlay has not been equivalent to, or has not counterbalanced, the advantage obtained.

335. With reference to the storage of water, I rather understood you to say that you are contemplating doing something more for the purpose of increasing your storage?—So far as the New River Company is concerned, storing is at present quite a vague matter of thought, because the necessity for it has not yet come; all I have said is this, that I know from gaugings made of the River Lea, there is water in that valley to be stored, which the company will be quite ready to gather and use when the need for so doing comes.

336-7. You think from whatever river the water may come, it is desirable to have the means of storage in order to be safe in case any time of drought should occur?—When you have reached the point at which you find you are drawing upon the river more than its minimum quantity could yield, then your time is come for making a reservoir, but while we have the power of always drawing in priority of others a certain amount that is always in the stream, there is not any necessity for constructing reservoirs.

338. You answer that question particularly as to your own company having a priority?—I do.

Re-examined by Mr. *Burke.*

339. In 1851 the question of constant supply, I believe, was maturely considered by Parliament?—It was fully considered.

340. The Act of 1852 was based upon that inquiry, was it not?—Yes; and upon the inquiry made in 1852.

341. All the provisions of the Act of 1852 were the result of the inquiry in 1851-52?—Of a very patient inquiry in those years.

342. And with all the provisions of that Act of 1852, based upon that inquiry, you have complied?—We have.

343. Although in the Act, by the 20th section, provision is made for a remedy in case of any of the provisions of the Act being violated, no application has been made under that 20th section to the Board of Trade, in respect to any violation of the Act by your company?—None.

344. I presume you gather from that, that the whole of the persons supplied by your company, have been satisfied with the fulfilment of the provisions of that Act?—Yes; we have reason to believe so.

345. Further than that, the 800,000 *l.* which you have spent, has been to fulfil the provisions of that Act of Parliament?—Yes; it has been so.

346. With regard to the constant supply, you told me yesterday that you had to supply constantly a number of houses, 1,200 I think, under the constant system?—Yes; there are 1,200 having, as we have been in the habit of calling it, a supply from the main, and many of them very old standing supplies indeed; the Inns of Court are so supplied, the chambers in the Temple, and houses in different places, for many years have had that supply by a small pea ferrule inserted in the main.

347. As to the general public, the conditions precedent to a constant supply, are an application by a certain number of parties, and at the same time an alteration of all the fittings in such a manner as to make that supply capable of being afforded?—Yes; in the cases in which we give a constant supply, where there is no meter regulating the supply, the waste is very considerable, and the supervision over those cases needs to be pretty close.

348. Mr. *Cripps.*] Do you mean with regard to those 1,200 houses?—In some portion of them the consumption is guarded by a meter; the meter acts as a watchman. In the cases where there is no meter, the supervision of the officers of the company requires to be close.

349. Mr. *Burke.*] As to the general public, there are conditions precedent to a constant supply in the application of the parties desiring it, and in their willingness to make their fittings available for that supply?—Yes.

350. Those conditions precedent have never been sought to be put in force by your consumers?—No.

351. My learned friend asked you whether it would not be fair for you to bear a portion of the expense of the fittings, but I suppose that they would be the property of the parties to whom the houses belong?—Yes.

352. There is no obligation imposed upon you that you should bear any part of their charge?—None; there would be no direct gain to the company in the matter; the having fittings of a proper description would be a duty for the public to save the company from what would be a grievous burden.

353. Has there been any application on the part of the public that the Act should be in any way altered to provide for your giving those fittings instead of the public doing it?—No, I have not heard of the suggestion before.

354. Are the company liable to considerable depredations in low districts, as to their fittings?—The company do not own them, and they do not suffer by depredations upon fittings, but they suffer from the waste which is consequent upon the cutting of the leaden pipes, and stealing cocks and other such proceedings.

355. Have you found among landlords of a low class of houses an unwillingness

willingness to put in expensive fittings upon the ground of their being liable to depredations?—Yes, that is the constant reason which is given by them.

356. It is the fact, is it not, that where a bit of brass or lead can be turned into money, it will be appropriated?—Yes, it is so.

357. My learned friend also asked you about your experience of Glasgow and Manchester, and you stated yesterday, that in Glasgow the effect of a constant supply is, that something like 50 gallons per head per day is consumed, a great part of which goes to waste?—That is so.

358. Mr. *Cripps.*] When did you get that information from Glasgow?—There are published returns to that effect.

359. Mr. *Burke.*] I have heard it stated over and over again?—I have not the returns with me, but they have been often given.

360. *Chairman.*] Can you supply the Committee with any tabular statement on the subject?—I have no doubt I can.

361. Mr. *Burke.*] Assuming that anything like a waste of that kind took place in London, then the existing sources of supply would soon be insufficient for London?—Yes, they would.

362. The whole of the Act of 1852 is based upon the supply obtained from existing sources?—Yes.

363. It provides, that all the different companies supplying London with water from the River Thames and the River Lea shall supply it under certain conditions?—Yes.

364. If a constant supply was introduced all over London, the existing sources of supply would be manifestly insufficient?—The company's existing means of supply would; but I think that London, possessing the great valleys of the Thames and of the Lea, would have a supply for many years, even at the extra rate of consumption which is going on in Glasgow, if the companies went to the expense of impounding the water in the two valleys; but it would be an unfair expense to put upon the companies, only for the sake of allowing the consumers to waste beyond what they can use.

365. You were asked by my learned friend whether Clause 22 in the Bill, requiring cisterns, was not with reference to a constant supply only; but a supply of cisterns is a necessity in the case of intermittent supply, is it not?—Not only that, but there are sections in the Company's Act which prescribe cisterns under the intermittent system.

366. Not only in your own Act, but in the Water Works Clauses Act, there is a distinct provision that where water is not supplied constantly, cisterns shall be provided?—Yes.

367. *Chairman.*] What clause is that?

Mr. *Burke.*] It is Clause 54 of the Waterworks Clauses Act (*reading the same*).

Mr. *Cripps.*] That is not under pressure.

368. Mr. *Burke* (to the *Witness*).] There is a cistern to be provided of a peculiar kind in the case of constant pressure, and there is a cistern to be provided in the case of non-constant pressure?—Yes.

369. In either case there must be a cistern?—Yes, in either case in London, and that makes the case of London peculiar. If proper cisterns are provided, the question comes, what can be the advantage of a constant supply. I think that the only cases in which a constant supply in London without cisterns would be advantageous, are the cases of very poor houses, and there something ought to be done.

370. My learned friend asked you about the purity of the water, and about the remedies for that. The provisions in the Act of 1852 are for the purpose of insuring the purity of the water by filtration, and covered reservoirs?—Yes, they are.

371. And with those provisions you have complied?—Yes, we have.

372. I suppose that any public authority has the power to test the water supplied by the company?—Yes, they have; and they do it.

373. Have you had no complaint made on that score?—None.

374. Does the Government have the water supplied to London tested from time to time?—No; but the Registrar General regularly publishes analyses, which are made privately for him now by Professor Frankland.

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375. Under whose authority is that done?—I believe it is done at the request of the Registrar General.

376. Under whom does he act?—I do not know, but I suppose under the Government.

377. Then, practically, tests of the water are made under Government direction?—Yes, in that way they are.

378. The Board of Trade can interfere, can they not, when any of those provisions are violated?—Decidedly.

Chairman (to Mr. *Burke*)]. Have you been put in possession of the papers headed, "Cholera in London," and which have been sent to the Committee by the Board of Trade?

Mr. *Burke.*] No.

379. *Chairman.*] You will get them, I suppose, in due time. (To the *Witness*) With regard to a statement furnished by the company, that your company supplies a district which is also supplied by other companies, do you supply the same street, or are the parishes divided between your company and other companies?—The parishes are divided, and in no case do the pipes of the two companies interlace one another; in some boundaries there may be the pipes of one company on one side, and the pipes of another company on the other side, but the pipes do not in any case interlace.

380. Do your mains go through any district that is supplied by another company?—They do not.

381. Have you any means of estimating the probable increase of populatio within your district, apart from the general estimate of increase of population?—Yes, I have, by the number of houses annually built.

382. How much of your district is entirely built over, and incapable of increased population by increase of houses?—Referring to the map behind me, you will see that the New River Company's district does not admit of expansion east or west, but only in one direction, and that is one reason why it has not increased so rapidly as the districts of some of the other companies in London.

383. That is to say, the space which is unbuilt upon, lies to the north only?—Yes.

384. Is there any rapid building of houses going on there?—Not very rapid; the actual increase during the past year in the number of houses added to the New River Company's supply was only ·98 per cent., or under 1 per cent.

385. That is 98-100ths per cent.?—Exactly.

386. I believe you have been engineer to the New River Company for a long time?—Yes; for seven or eight years I have been engineer in chief, but I have been connected for many years with the company as assistant engineer.

387. During the last 20 years has their been a peculiar increase in the number of houses built in your district consequent upon the railway termini coming into your district?—I do not know that railways have very much affected the New River district by the erection of houses.

388. With regard to the reservoirs that have been spoken of, has your attention been called to the report of the River Pollution Commissioners on the River Lea?—I have not yet seen it.

389. I will read to you this paragraph of the report, at page 21, and ask your opinion as to it: "With regard to the capability of the River Lea to meet the increasing demand for water supply in the eastern districts of London, the entire volume of water daily drawn direct from the River Lea amounts to 38,000,000 gallons, the New River Company drawing upon an average 18,000,000 gallons, and the East London Waterworks Company 20,000,000 gallons. In very dry seasons some difficulty is experienced by the latter company in obtaining their customary volume. It may, therefore, be taken that no dependence can be placed upon an increase of the supply from the river, without the construction of impounding reservoirs on a much larger scale than those now in existence. The construction of such reservoirs has been a matter considered by the Lea Trust and by the Water Companies. The Marquis of Salisbury explained to the Commission a system of impounding reservoirs, designed by the late Mr. Rendel, for the Lea basin; two to be constructed on the Lea itself, and others on the Ash, Rib, and the Amwell Marsh, capable of holding some 6,212,500,000

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6,212,500,000 gallons of water, a volume sufficient for 140 days' supply, at the present rate of delivery from the Lea. It is questionable whether these chalk valleys can afford sites for reservoirs to hold such large volumes of water, unless great expense were incurred in puddling. In Mr. Muir's opinion, it would be very difficult to make large reservoirs above Hertford. Extensive reservoirs might with ease be made below the point where the Lea passes from the chalk on to the London clay The reservoirs of the East London Company, in which there is storage for 170,000,000 gallons of water, cover 120 acres. But reservoirs, to hold the volume of water contemplated by the late Mr. Rendel, would probably require an area of 2,000 or 3,000 acres; and though large storage reservoirs may be made available to reserve flood waters, yet, if, in dependence upon such a store, a corresponding enlargement were made in the area of supply, then, in the event of several dry years following each other, the continued drought would most probaby end in the exhaustion of such store, and, consequently, in temporary failure." You have spoken of your power of increasing your supply at the pointfrom which you draw the water, but has that any reference to the supply that would be necessary for the East London Company, or does it assume that you have the power of drawing your supply without reference to their supply?—We have the power, at Hertford, of drawing the water without reference to their supply; twenty-two millions and a half of gallons per day; and the additional quantity of water to which I alluded this morning, would not, and could not, I think, be drawn at that point; unless reservoirs were made high up the valley, we could not get additional water at Hertford. It was my opinion expressed to the commissioners, that reservoirs in the upper part of the valley could not be profitably made; and if the flood water is to be stored, it must be stored at a lower point.

390. That is below Hertford?—Yes, below Fielde's Weir, on the site marked on the map, but with reservoirs at that point some addition might be made; although still I have not gone so closely into the matter as to be able to speak to it with any great definitiveness, but some addition to our present supply may be made.

391. When you speak of obtaining 10,000,000 gallons daily where you are now drawing the water, how would you obtain that?—By getting the water into that reservoir below Fielde's Weir.

392. How would that affect any supply drawn below that by the East London Company?—The East London Company have power by the Act of 1855, under which we also proceed, to do the same thing.

393. But if you intercept the water above where they draw it from, how shall they get it?—We should not do that, and it must be by an arrangement made with them; whatever we take, it can only be half the surplus, they taking the other half.

394. Do you mean half the surplus, after taking the twenty-two millions and a half of gallons?—Yes.

395. Which is nearly what you take now?—Yes, we take about 18,000,000 gallons.

396. To enable you to get 10,000,000 gallons, there must be of course surplus of 20,000,000 gallons in the river?—Exactly.

397. As a matter of fact, are there 20,000,000 gallons in the river in dry weather to be obtained in addition?—The average calculated during the inquiry formerly made was 90,000,000 gallons per day.

398. At this point?—Fielde's Weir; and the largest draught of the two companies from the River Lea amounts to half that quantity.

399. Is Fielde's Weir the point where you now cut the river for your supply? —No; it is where the gaugings are made.

400. How many miles is that below the place where your tumbling bay is?—I suppose it is about five or six miles below the place where we draw the water from the Lea at Hertford. I was going to say that that quantity is much more than could be depended upon in a dry season; it would have allowed twenty-two millions and a half daily additional to each company, but in saying yesterday what might be got, I stated 10,000,000.

401. Do you mean that there are 90,000,000 gallons in dry weather passing down the river at that point?—It is not so, and I do not calculate upon that, because it is only on the average of years that the 90,000,000 gallons could be got; that is to say, there are certain dry years when not nearly that quantity is to be had.

I have here a series of gaugings from 1857 down to the end of the past year, and in all cases but one there has been an ample supply for the 10,000,000 gallons of which I spoke; but in the year 1864, which was an extraordinary year of drought, the surplus then amounted only to sixteen millions and a half of gallons.

402. Over the quantity you were actually drawing?—Yes; allowing therefore for each company a little over 8,000,000, I could only get the 10,000,000 in that year by making a reservoir so as to get the benefit of the higher supply of the previous years, which would have been quite ample for that purpose; the getting the 10,000,000 would involve the construction of a considerable reservoir, the details of which the New River Company have not had any need to go into.

403. Have you given your attention generally to this question of reservoirs, so as to be able to say whether the views expressed by the River Commissioners are in your opinion practicable?—I gathered from what you read, that their view amounts to this, that only to a certain limited extent reservoirs in the valley of the Lea would be useful, and it is only to a limited extent that I expect to get anything from them.

404. What would be necessary to make good the deficiency in the driest year within your own recent experience; what would be the capacity of the reservoir required?—Probably, 450,000,000 of cubic feet, speaking roughly, would carry me over the longest period of drought; I know that from the gaugings which have been taken.

405. Would it be a work of very great expense?—I think not, but I still speak cautiously, not having gone into any estimates. I think there are sites below Fielde's Weir, where a reservoir such as would be required, could be made for something like 300,000*l.* or 400,000*l.*

406. Would there be expensive works required to intercept the drainage, and to keep the Lea clear as low down as Fielde's Weir?—That would be required; I should say that we could not contemplate making such a reservoir until some satisfactory arrangement for the removal of the drainage of the upper towns has been come to.

407. Is it your opinion that within those limits you could preserve throughout a dry year an abundant supply of water from the River Lea to meet the estimated excess of 10,000,000 of gallons?—I think so.

408. What is the capacity of the New River for bringing the water to London; what quantity would it bring, supposing there was a free flow at the London end of it?—I believe that its carrying power now is equal to twice the quantity that it is doing.

409. What is it doing; does the whole quantity of water come down from the lower part of the river?—It is now delivering at the rate of 23,000,000 or 24,000,000 gallons a day.

410. If any further supply is required, it could be delivered through the New River?—It could, and if it were not sufficient, an easy enlargement of the river channel could be made.

411. Are your works at the end of the river capable of receiving and delivering a very much larger quantity of water than they do now?—They are, and they are also capable of enlargement; the erection of additional steam engines as the supply increased, and also the construction of additional filtering beds would go on.

412. What addition could be made without incurring any large expenditure at the terminal works?—We now use only about half of our steam power, and there is a large margin there we are now adding to the filtering beds.

413. Are the filtering beds now used to the full extent, or could they deliver any more water?—The existing filtering beds could deliver more water; after the two beds, which are now in course of construction, are made, we shall have a large surplus of filtering area for some time.

414. You stated, I think, that there would be an expense in each case of 8 *l.*, to give a constant supply of water; how would that be required?—By the substitution of strong leaden pipes for the defective pipes which are now used in houses; that is the chief cause of expense, and in connection with the laying down of those new pipes there would be the opening of the ground and paving to be paid for, and a provision would have to be made inside of the houses in the shape of proper taps, screwed down high-pressure taps, instead of the very imperfect cocks which are now in use, and also other matters, such as proper water-closet apparatus.

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ratus. I believe that the great waste in London which takes place in connection with the domestic supply is in connection with the water-closet part of it.

415. Is each separate house in a district, supplied with a cistern?—In almost every case, although there are exceptions; there are a few groups of houses in very poor localities, which the landlords have left entirely without cisterns, and they have left the poor tenants to depend upon a pipe placed in a court, coming through a wall, where they have to go out and draw the water, which is a most imperfect arrangement.

416. You cannot, I suppose, interfere with that?—We have no power to do so.

417. In those cases is there a sufficient supply of water to the inhabitants?—No; it is in consequence of these deficient arrangements very insufficient, and through no fault of the companies.

418. Does the demand for a constant supply arise from the fact of these groups of houses which you have mentioned, being so insufficiently supplied with water?—I think it furnishes one reason why a constant supply should be asked for in particular cases. The New River Company have often expressed their perfect willingness, if the owners of the property would properly provide for it, to give a constant supply for the poor people, who keep their water in store in rooms, where there is vitiated air.

419. Have you found the owners of property unwilling to incur that expense?—Generally speaking they will incur no expense.

420. There is a short supply of water arising from the owners not having provided cistern capacity equal to the number of the inhabitants?—Entirely so.

421. Does that also apply to houses which are let out in lodgings?—Yes, very much so.

422. Is the cistern usually one that was originally put up upon the assumption that the house would be occupied by one family?—Yes, frequently it is so.

423. Are there now often four or five families in a house who have only the supply that was originally intended for one family?—Yes, in many cases.

424. Have you no means of altering that state of things?—No; the parochial authorities do their best, but in many cases they fail to bring about a better state of things.

425. The effect of a constant supply would be, would it not, that in those cases where the means of storage were insufficient, the quantity of water would be sufficient if the cistern were filled as soon as it was emptied?—Yes, there are cases in which a constant supply under proper arrangements would be a real advantage; but where a cistern could be properly placed, and protected, there seems to be little advantage to be gained.

426. In the houses which have been properly provided with cistern capacity for the number of inhabitants, there would be no particular advantage in a constant supply?—None, but there would be this disadvantage if there was no cistern, that when the company's pipes were shut off, as they must often be for repairs, there would not be a drop of water to be had in the houses with no store.

427. The difficulty arises where the number of the inhabitants in a house are greater than the cistern provided will contain sufficient water for?—Yes; there the deficiency begins to be felt.

427*. Therefore in those cases a constant supply would be a remedy?—Yes, and it would be willingly allowed by the company, if the water were only taken under some waste-preventing arrangement.

428. Would it be an equal remedy if the landlords were made to provide sufficient water receptacles for the tenants of the houses?—As regards quantity it would be quite a sufficient remedy; but in some very poor places it would not be so good as regards quality, for there are places where the storing of water in cisterns is necessarily bad, affecting the quality of the water; and what we should recommend in that case is that the water should be taken by a waste-preventing apparatus, drawable at all times from the main direct.

429. How would you accomplish that, for it appears that the inhabitants or temporary occupiers cannot incur expense, that the landlords are unwilling to do it, having no sense of propriety, and the company would not do it because they would derive no benefit?—I can only see a way of doing it in this manner, that greater power should be given to the parochial authorities to require landlords to provide such waste-preventing apparatus, as that the water might be in

those cases drawn directly from the main; and only in those cases would I recommend the absence of cisterns, for I think that in those cases it would be better to be without them, although there might then occasionally be suffering from the main being shut off.

430. You would suggest that the local authorities should have power to require the landlords to do what is necessary, and if they failed to comply, that the local authorities should do it and charge the owners with the expense?—I think so.

431. Do you think that if that was done in all cases where there was insufficient cistern capacity for the number of the inhabitants, the necessity for a constant supply would be obviated?—Yes.

432. Unless that is done, some arrangement ought to be made to ensure a sufficient supply of water to the inhabitants?—Decidedly, and it is quite true that there are many cases in that class of property where the supply is in a very bad condition, through no fault of the company, for in many cases the company have done as much as they possibly could by solicitation of the landlords, and by actually laying down pipes to bring the water to the doors of the houses, and offering in some cases, if they could get any guarantee for their outlay, to provide proper cisterns and proper apparatus in the houses; but although that offer has been made, we have not yet seen our way to carrying it out in practice, for the landlords will not take the trouble to give us the guarantee we require as to the expense.

433. I observe in the accounts of your company, that there has been a rapid increase in the dividends in the last two or three years; can you explain how that has arisen?—I do not know of any one particular cause for it. There has been an increase in the annual value of the property, which has had the effect of raising the rent derived by a per-centage on the annual value.

434. Is that in consequence of the re-assessment of the metropolis which has taken place?—Yes, and also this, that in many parts of the company's district, from not having been closely looked into, the old rents were allowed to remain at a very low figure, and they have, as changes of tenants have taken place, been raised to their proper amount.

435. I suppose your company cannot make an assessment for itself, but it depends entirely, does it not, upon the assessment for the poor rates?—No, the company makes its own assessment.

436. Irrespectively of the public assessment?—Yes, but the company's assessor is guided in a great measure by taking into account the assessments made for other purposes.

437. Has your company made an assessment in some cases above the assessments made for the poor rates?—In most cases the company's water charge is upon the full annual value of the premises, and exceeding, therefore, the annual value on which the poor rate is taken.

438. What remedy has the inhabitant householder if he finds that he is assessed by your company higher than he is assessed for public taxes and rates?—He could, I suppose, appeal to a magistrate upon the matter.

Mr. *Burke.*] I will send for the Act to see how that is.

439. *Chairman.*] I understood that there were cases in which your assessment was above the poor rate assessment?—Yes; I may mention that the company have power to charge upon the full annual value, while the poor rate is always within that; there are cases in which the company's rating is upon the higher basis.

440. Is the full annual value the same thing as the gross estimated rental is understood to be in assessing property?—I think so. There are very many cases in which the company have not gone to the full annual value of the property; where property has some adventitious value, the company do not go upon that, but they use their own judgment, and especially in the City they have charged upon a very much reduced annual value.

441. Have they raised their rates up to the point of the assessment which has been made in the City?—No, not nearly.

442. Do you mean that they are charging in the rest of the metropolis upon a different principle from that upon which they charge in the City of London?—They necessarily do so in consequence of the extra value which property has in the City.

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443. They are not assessing to the full annual value in the City?—No.

444. But they do in other places?—Yes, generally outside the City to the full annual value, except in certain cases.

445. Mr. *Burke.*] The 68th section of "The Waterworks Clauses Act" is in these terms: "The water rates, except as hereinafter, and in the special Act mentioned, shall be paid by and be recoverable from the person requiring, receiving, or using the supply of water, and shall be payable according to the annual value of the tenement supplied with water; and if any dispute arise as to such value, the same shall be determined by two justices." Have you had any applications under the 27th section of the Act from the churchwardens and overseers of any parish?—I believe that we had one application under this clause from the parish of Hornsey, and a large number of houses of the poor were laid on and supplied with water under the provisions of this clause; and in regard to a number of other houses of the same class, the company have supplied them at reduced rates, though no application has been made to them in the terms of that section.

446. Except at Hornsey?—At Hornsey there was, I believe, an application some years ago, and a number of houses were laid on under that section.

447. Then is that section in its terms satisfactory, and workable?—It appears that there is a little dubiety in the reading of it, I believe; but as regards the working of it, it is so far satisfactory that many, without having actually put the section in force, have had the advantage from the company of the reduced rate which this section was intended to give in the case of poor houses.

448. Have you an absolute power of entry into houses at stated periods?—Between certain hours of the day we have; but I believe that under the constant supply system, the amount of supervision would hardly be sufficient. The chief waste would probably take place at night, when we have no power of entry. It would take place by the common practice of holding up the handles of water-closets, and allowing water to run down all night long, for the purpose of clearing the drains; because of the badness of the apparatus which is generally provided. A drain would be very effectually flushed by allowing a small quantity of water to pass down it suddenly, but it would be very imperfectly cleansed by a perpetual dribble.

449. I see that you have cut off the water in a great many cases in the course of the year; what is the result to the inhabitants, or are the houses empty in those cases?—In some cases they are empty; in some cases the result is that the persons whose water is cut off, immediately put the apparatus right, and are laid on again. In other cases there has been a necessity for cutting off by reason of damage done to adjoining property, or to the public street. I believe that in the majority of cases the leakages have been from lead pipes under the pavements, and they cannot be allowed to continue without danger to the public; and, therefore, notice is immediately served on the owner to repair, and he repairs, and it is again restored.

450. Is it his duty to repair under the pavement?—It is; the whole of the leaden pipe under the house belongs to the landlord.

451. In those cases have the repairs been done immediately?—Immediately after the water has been cut off.

452. Then are we to understand that there are not many cases where the inhabitants have suffered from want of water in consequence of being cut off?—I think not.

453. You spoke of the average supply of a house daily which you have ascertained by meters, measuring blocks of buildings; was that a fair test of the average consumption of the population?—The experiment I alluded to, as made some years ago, showed what the consumption was where waste was very carefully watched against. The consumption then was at the rate of seven gallons per head per day. In the other experiment to which I alluded, when a comparison was made between the intermittent and the constant supply, the consumption, under the intermittent system, with slight waste, the houses being in tolerable order, amounted to rather more than 10 gallons per head. I find on looking at the notes of yesterday a mistake on this point; it may be my own mistake, but it is a mistake. The consumption in the case of the experiment with meter lately was at the rate of 10 gallons per head under the intermittent system, and under the constant system the same houses took 16 times that quantity, or 160 gallons per head.

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454. Were the houses which were selected for that experiment large or small houses?—They were taken purposely of a very average class, the rental being about 36 *l.* a year.

455. And were they houses inhabited by single families?—They were.

456. Did you actually ascertain the population in the houses, or did you merely take an estimate of the number of inhabitants in the houses?—We only took an estimate of the number of inhabitants, in the knowing from experience what is generally the average in houses of that class.

457. Those were houses, I presume, without baths, or any additional consumption of water beyond the ordinary use?—They were.

458. Is there great difference between the supply of houses of a better kind, where there are baths and other conveniences, than those which you refer to?—It is rather higher, but this amount which I mention included some waste. I believe I stated yesterday that 10 gallons per head would be a very good average, and an ample supply for mere domestic purposes. I take that as an average, taking the larger houses with the smaller houses, but the actual domestic consumption now in the New River District is between 22 and 23 gallons per head, instead of 10, as great waste takes place in private houses.

459. Mr. *Kekewich.*] You mean only for domestic purposes?—I mean only for domestic purposes. When I add the trade and the street consumption, it brings that number of 23 gallons up to the 28 or 29 gallons, which I mentioned yesterday.

460. *Chairman.*] And out of those 23 gallons per head, a very small quantity is used for purposes of health?—Comparatively small for mere drinking and cooking purposes.

461. Therefore, assuming that the water were not of a quality that some people may think fit for drinking, that observation would only apply to a very small per-centage of the water supplied to a house?—To a very small percentage; but for the enormous cost of laying down duplicate pipes, the suggestion which has been thrown out for having a pure supply for other purposes would be a very good one.

462. Have you ever considered what the expense would be if the necessity arose for laying down a second supply merely for the consumption of man, apart from domestic consumption?—I made approximately an estimate of what duplicate lines of pipes of smaller diameter for delivery in the New River district of the smaller quantity of water which would be required for those drinking and cooking purposes would be, and made out something like 600,000 *l.* for the New River district, including, however, I should say (which would be the chief part of the expense), a large main running into the country.

463. Your spring water, apart even from the New River, is equal to what portion of your whole supply?—The whole supply last year, on an average, directly from the Chadwell spring, was 500 cubic feet per minute.

464. What would that be in gallons?—I should say it would be four millions and a half gallons per day.

465. That would be 4,000,000 out of 23,000,000?—That would be 4,000,000 out of 23,000,000.

466. Have you any idea of what would be the proportion of water actually used for food and drink, as compared with the whole supply per head?—No; I have often tried to get at it, but I have not done so accurately. I have allowed in this approximate estimate between five and six gallons per head per day, which would be very ample. I should explain that this estimate, having regard to the future by laying down a large main, provides for a much larger supply than could possibly be used now.

467. People will drink the same quantity, we hope, 50 years hence, or less perhaps than they do now; but how much would be consumed per head per day for drink and for food?—For mere drink and for cooking food, I do not believe that it would reach two gallons per day.

468. That would be then one-fifth of the 10 gallons which you have allowed per head?—Yes, I have allowed so much spring water per head upon the present population, for the purpose of allowing for a double population or more in the future.

469. Then, in point of fact, your springs would supply the entire population in your district with spring water, if you had a double population?—Yes.

470. Without going to any new source?—Yes.

471. Do

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471. Do I rightly understand you that they would admit of a very large extension also, without going to any new source?—By bringing up the spring water which comes up from those deep chalk wells.

472. So that if it were necessary, at an expenditure of 600,000 *l.*, you could, if necessary, supply the whole district with pure spring water?—Yes.

473. And that would be on the principle of constant supply, I suppose?—There would then be little or no objection to constant supply, because the apparatus could all be supplied *de novo*.

474. You would take care, then, that the tap was turned into the room, so that if they let it run to waste they would suffer for it?—Some such safeguard as that might be adopted.

475. And, therefore, if any question arises as to the advantage of having any better water than you now deliver, you could meet the requirements of the most philosophic or chemical, or medical mind, at an expense of 600,000 *l.*, from your present resources?—I think so. It might be well to add, that that estimate does not include the lead pipes or service pipes that would be laid into the houses. I am supposing, in that estimate, that the owners of houses would branch from our mains with this new drinking supply for themselves as they do at present.

476. Then, apart from what has already been stated, do you see any advantage from a constant supply of water?—The chief advantage is the case of the houses of the poor, which I have already adverted to; and the other advantage is, the saving of the expense of a cistern in the case of new houses; if you do not allow that, the drawback of having no cistern, and therefore no water, when the mains are off for repairs, is a counterbalancing thing.

477. Then, in that case, you would have to set up a stand pipe on the next main, and they would have to go and get their water from it?—They would. It might be a long way off.

478. Mr. *Henry Baillie.*] By the present intermittent system which generally prevails, is every house dependent upon the quantity of water which it receives in its cistern once a day?—It is.

479. And are not those cisterns very often very much fouled?—They are very often so placed as to contract a good deal of impurity.

480. Even amongst the best houses that often occurs, does it not?—I think they are often badly placed by architects in houses, and the result is that impurities get into them, or they are in so inaccessible a position, that they are not cleaned out as they should be.

481. Are those cisterns generally of lead?—Generally in the older houses they are, but of late years slate cisterns, and in some cases iron cisterns have been used.

482. Then, as regards drinking water, the water from those cisterns may be often supplied very pure from the company, and may become fouled in the cistern?—If care is not taken with the cisterns, that may be the case.

483. Mr. *Kekewich.*] In case of your having two pipes, where would you take in the supply of the less pure water which is not used for drinking purposes; would you take it from the River Lea?—No; I am supposing now that we have spring water, and that the water of the Chadwell spring and also the water of the various deep chalk wells, which the company has, is gathered together into this main, which is brought to London and branched out, so that the second supply might be given to houses as from the existing mains.

484. But the second supply for water-closets and so forth, would not be the same pure water?—That would still come, I suppose, from the Lea.

485. And where would you propose to take in that supply?—As now, at Hertford.

486. If there were two pipes, you would not interfere with the drinking water, the pure water, which you draw from the spring, would you?—We have no definite plan at all upon the matter; at present spring and river supply is mixed, but the suggestion having been thrown out that it might be possible to deliver water in London of a purer description in smaller quantities for drinking and cooking purposes, and a larger supply of less pure water for water-closets and other ordinary use, I have turned the thing over in my mind, and I have just estimated what it would take to bring the New River Company's spring water to London, and branch it out by pipes in every street.

486*. Then the less pure water you would take from the River Lea?—We should not interfere with the spring for the less pure water.

487. Mr. *Burke.*] You would want an additional rent for this double supply, would you not?—No doubt of it.

488. Colonel *Hogg.*] Do you give a Sunday supply in all cases? — In a great many cases; it has been the rule of the company wherever the parochial authorities have represented that there were houses of the poor which were so neglected by their landlords that they could not on Sunday get a proper supply, that company have given a Sunday supply; and they added so much last year to the number of their Sunday supplies, that they now give a Sunday supply to between 40,000 and 50,000 houses.

489. I think you stated that a constant supply would be beneficial in a sanitary point of view to poorer districts?—I think so.

490. You stated also, did you not, that you thought there ought to be some legislation to compel landlords to make better supplies of cisterns for storing water for the poor?—Or for providing such a waste-preventing apparatus as would make it possible to give them a constant supply, which would avoid the fouling of the water by bad cisterns.

491. Are the supplies of water for cab-stands and fire-plugs, and so on, supplied from meters?—Those supplies have not had meters; but drinking fountains have many of them meters; and watering of roads has generally been by meter.

492. How do you check the supply of water?—Where the meter is used the consumer takes care not to waste, for he is charged according to the quantity which he takes.

493. Do you not think that the supply to private houses might be checked by using meters, and that so you might give a constant supply?—No doubt; but the Act of Parliament had laid it down that the charge shall be according to the annual value of the premises supplied, and not according to the quantity of water delivered, and for this reason,—that if it were according to the quantity of water delivered there might be some reason for persons being too economical in their use of water.

494. You mentioned the necessity for stopping water for repairs; have you ever tried laying your pipes in subways?—We have in one case, in the parish of Covent Garden, laid some years ago, for the sake of experiment, a small line of pipe in that way.

495. Have you found it answer?—We have, as yet, found no inconvenience from it.

496. Have you not found that it saves the company considerably from pulling up the streets?—We have had no occasion to pull up the streets in that case; and had the pipe been laid in the ordinary way, it would not have been necessary yet to take up the street; but the first laying of that pipe cost us more than if it had been laid in the ordinary way.

497. Will it be an ultimate saving to the company?—That has not appeared.

498. Do you think it will be?—I do not think it will.

499. Do you not think it will be a convenience to the public?—In the avoidance of breaking up the street, everybody will admit that it would be a good thing, and if it were not subject to risks it would be desirable.

500. What possible risk is there?—The great risk is that of an accumulation in the subway chamber of gas, and explosion.

501. I am dealing with water, and not with gas?—The mere laying of water pipes in a subway would involve nothing probably but some little addition of cost to the companies; but the chief objection of the Water Companies would arise from this, that alongside of their pipe would be a gas pipe which was liable at any moment to leakage, and liable, therefore, at any moment to a terrific explosion.

502. If the gas pipe were sunk a little in the ground, would there be any danger of that?—I think so, because the gas would rise through the ground into the chamber above.

503. But supposing there were ventilation in the subways, would that objection apply?—I think the subways could never be so ventilated as to be safe against the risk of an explosion from gas.

504. Mr. *Burke.*] I believe that where they had gas in subways at Paris it blew up, did it not?—It did.

505. Mr. *Benyon.*] With regard to the water supply on Sunday, the company does

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does give a supply on Sunday to 50,000 out of 112,000, does it not?—Between 40,000 and 50,000 houses have a Sunday supply now.

506. What is the objection to giving all houses Sunday supply?—Because, in other houses, there is no real necessity for it; and, although the company pay all their men who are liable to be called out to do such work as if they worked on Sunday, they think it not fair to their men to deprive them of their Sunday's rest.

507. And that is the reason, then, and not any saving of water, but because they do not want to work their men on Sunday?—Exactly.

508. You mentioned two or three public bodies, and other houses, did you not, to which the company gives a constant supply already?—I did.

509. Do they comply with the terms of the Act of Parliament?—Only in a few cases, because many of them have had the supply by a pea ferrule from the main many years before a constant supply was thought of or spoken of.

510. Therefore, the company does not insist upon the terms of the Act of Parliament being complied with in cases where they do give constant supply?—If an applicant came now to the company requiring constant supply, they would do so, but in regard to those old tenants who have, some of them, had water for 100 years, they have left things as they were, taking care to keep a very close supervision over the tenants to prevent excessive waste.

511. Lord *Frederick Cavendish.*] In case of a double supply of water, one quality for drinking, and the other for general purposes, how could you prevent the first supply being used for the second?—We could not prevent it, but one would suppose it would be quite safe to leave it to the consumer himself, if he knew that he had one tap from which he could obtain purer water than the other.

512. But if it were more convenient, would he not use the purer water for general purposes also?—He might do so.

513. There would be no means of preventing it, would there?—There would be no means of preventing it, except by limiting very much the size of the orifice through which the water of the purer kind was delivered.

513*. In case of fire, would not a constant supply be a great advantage over an intermittent supply?—I do not think the advantage is very great; it is quite true that there are certain disadvantages now connected with the supply of water in London for fire, and they all arise from this: that sufficient care is not taken to call the turncock, who alone, as things are, is able always to know where to get the water; it is quite true that if the fire brigade used the keys which they have obtained from the companies, and make themselves acquainted with the pipe arrangements of the company's district, they might help themselves whenever they pleased; but they have hitherto declined to take that responsibility, and there has hitherto been also somewhat of carelessness often in the calling of the turncock; so that in some few cases the engines have arrived at a fire before any person has thought of going to the turncock to obtain water for them. That is no fault of the company, and in the great majority of cases the turncock is on the ground first. You hear of some few cases in which, from want of being called, he is last, but never of the many in which he is first.

514. But in the case of fire breaking out, is it not the case that, with a constant supply of water, a fire might be extinguished immediately, or before it reached any dimensions, whereas with an intermittent supply there is no means of checking it at once, and the fire might become large?—I think the advantage of the intermittent supply is that it has a store of water in the cistern, which may be applicable to check a fire by a small quantity being thrown on at first; but under the constant supply system you might be liable to this, that a main might be under repair, and there might not be a drop of water to be had in the house, or in the street.

515. But if the main were not under repair, there would be a greater command of water on the first breaking out of a fire, would there not?—There would.

516. *Chairman.*] But in that case would the persons with the engines still require to know where to go to get the water?—The change that is needed, so as immediately to know where to get water for the extinction of fire, is this: that there should be what we spoke of yesterday, viz., a hydrant marked up properly, so that anyone, on the outbreak of a fire, could open the cock and draw the water from that. That is an arrangement which could be made with mains under one system just as well as under the other, but it would involve to the Metropolitan Board of Works, or some such body, a considerable outlay.

517. If

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517. Is there any summary remedy against your Company to an individual who complains of not receiving a sufficient supply of water, or must he get others to associate with him in a general complaint?—I do not know, except it be an application to a magistrate or two justices.

518. Is there any power in your Act to enable an individual to do so?—I do not remember at the present moment whether there is or not.

519. I mean, is there power to obtain a remedy for any personal grievance; supposing, for example, that gas comes into your house through the water pipe instead of water?—I do not think, even if there be no provision for it in the Act, any practical difficulty would arise. The complaints are so immediately attended to, and it is so much the interest of the companies to attend to the complaint of an individual, that I do not think any practical difficulty arises, even though provision is not specially made for that in the Act.

520. You do not know whether there is any such provision?—I do not now remember a section of the Act referring to that point.

521. Have many requests been made to the company to have the water turned on at shorter intervals than they have previously turned on the water?—In connection with the Sunday supply there have been; but I think the large increase lately made in the number of Sunday supplies given in the New River district has put an end to complaints of that kind, so far as the New River Company is concerned.

522. Otherwise they turn the water on once a day, do they not?—Once a day.

523. Are the houses fitted with cisterns sufficient for that arrangement?—They generally are; and it can only be in cases where the cisternage is not sufficient that any inconvenience can be felt.

524. Mr. *Benyon.*] What is the average time of the arrival of a turncock, after the first alarm of fire?—I find that during the past year there were in the New River district 389 houses on fire, and that the interval between the outbreak and the call of the turncock was, on an average, nine minutes; and the turncock's arrival was, on an average, five minutes later.

525. *Chairman.*] Can you give in the table which you promised, with reference to the supply of water in other towns, and a statement as to what the arrangements are for the delivery of water to the houses in those towns?—I think you will have very full evidence upon that point and upon all matters connected with the supply of water in other towns, by a following witness.

526. Mr. *Burke.*] When you gave 600,000 *l.* as the cost of giving this additional supply of pure water, did that include fittings to houses as well?—It was exclusive of that, as I mentioned particularly.

527. Are the returns which have already been made with regard to your company correct?—They are.

[The Witness withdrew.

Mr. *Clerk* read a correspondence between the East London Water Company and certain memorialists, in reply to a remark made yesterday by the Chairman with regard to Captain Tyler's report not having been sent in.

The *Chairman* intimated that this was not a matter which was now before the Committee, and that therefore it was unnecessary to pursue it.

Mr. *Clerk* stated that he would now proceed to call Mr. Greaves, on behalf of the East London Waterworks Company.

Mr. *Charles Greaves*, called in; and Examined by Mr. *Clerk*.

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528. You are Engineer to the East London Waterworks Company, are you not?—I am the Engineer to the East London Waterworks Company.

529. And I believe that you have been their engineer since 1851?—I was appointed to that office in the latter part of the year 1851.

530. And from that time to the present you have had the superintendence of their works and their supply, without any other professional engagements, have you not?—I have had the superintendence of their works, and the designing and carrying out of all their engineering affairs, without any other professional engagement.

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531. I believe that you have seen the inquiries which have been made on the part of the Select Committee, and the answers which have been given to them on behalf of your company?—I have carefully helped in the construction of those answers.

532. And are those answers correct?—Those answers are as correct as they can be made

Mr. *Clerk* asked that the answers might be put on the notes.

The *Chairman* stated that they would be printed as an appendix.

533. Mr. *Clerk* (to the *Witness*).] The company was constituted in the year 1807, was it not?—Yes, the East London Waterworks Company was constituted in the year 1807.

534. And their first supply was, I believe, to be taken from that part of the River Lea below Lea Bridge Mills?—The first transaction of the company was the purchase of two pre-existing ancient waterworks, the Chadwell Waterworks and the West Ham Waterworks. Those two old works were continued in action for some years; but the first new works which the company undertook was the establishment of reservoirs and pumping engines at Bow. Those reservoirs were on the side of the River Lea in its tidal portion, and the privilege which the company acquired was to take water from the Lea only during the tidal flow.

535. And you are prohibited from taking it at any other time?—Yes.

536. In the year 1829 you were authorised, I believe, to take the water above the tidal influence of the Thames above Lea Bridge?—It having become objectionable to continue deriving the supply from the river during its tidal flow, a movement was made to take the water from the river above the tidal flow, and Lea Bridge was the part chosen, and power was acquired to take the water from there.

537. You had, I believe, to provide certain compensation reservoirs for the mill interests below Lea Bridge?—Compensation reservoirs were made for the benefit of the millers.

538. Under the Act of 1829, was there an open aqueduct made from the river, near Lea Bridge, to the reservoirs at Old Ford?—Yes, an open aqueduct; a communicating channel was made from the river in the neighbourhood of Lea Bridge Mills, by which the reservoirs at Old Ford were supplied.

539. And the water, from 1829 up to the year 1852, was taken, I believe, from the Lea Bridge Mill-tail and carried down in an open aqueduct to the reservoir at Old Ford?—It was so until the year 1852.

540. In the year 1852, did considerable changes take place in the mode of the supply of the water of the East London Company?—Yes, in the year 1850 a change in the rights grew up, by which the company were enabled to take their water above Lea Bridge Mills, but that privilege was only partially exercised, as new works were designed for taking it at a considerable distance above.

541. You were not examined, I believe, in the year 1851, upon the inquiry before Sir James Graham's Committee?—I was not examined in the year 1851.

542. But I believe that, in the autumn of that year, you prepared plans for the additional works which might be required for the East London Company?—I did. I advised the company, on their acquiring that advice to be given as to the best measures that could be taken then for the improvement of their supply, to proceed to Parliament for the construction of the works which were afterwards enacted.

543. And I believe you selected, as the place where you were to take the water, a point a good deal higher than Lea Bridge, viz., the Tottenham Mill-tail?—Yes.

544. Were you anxious to go higher?—Not at that time.

545. When your Bill was before Parliament, in the year 1852, was it suggested to your company that they ought to proceed higher up the river, if possible?—Yes, it was; and the works, to a great extent, were put in abeyance. The complete form in which they had been designed was not carried out, and the works to a certain extent were put in abeyance pending an application to Parliament for power to take the water many miles further up the river.

546. And I believe that accordingly, in the year 1853, you came with a Bill

to Parliament for power to take water above Field's Weir?—For power to take the whole of the supply at a small distance above Field's Weir.

547. Field's Weir is the junction between the Stort and the Lea, is it not?—It is the point where the last of the six tributaries, which conjointly form the river, unites with that river.

548. I believe that you were met by the opposition of the War Department?—We were.

549. And I believe that they refused every proposition which was made to them for any compensation for the supply of water to the Government Works below Field's Weir?—A very long and serious consideration of the matter was entered into with the Government, with a view to our giving the amount of water power which they would lose, but they declined altogether doing so, and they declined to accept steam power in compensation, and so determinedly did they resist us, that the plan had to be abandoned.

550. Was it in consequence of that that you were obliged to construct the works as they had been sanctioned in 1852?—We were obliged to construct the works as they were sanctioned in 1852.

551. You took that water then from the Tottenham mill-tail?—We took the water from the tail of the two mills above Lea Bridge. The Tottenham mill-tail, and the Copper mill-tail were united by a channel specially constructed, so that we received the water coming by both those lines of conduit.

552. And I believe that the same time you had to construct an intercepting drain from the point where you took the water as high as Enfield, for the purpose of intercepting sewage on the right-hand bank of the river?—The intercepting drain was part of the plan, and the work was constructed so as to intercept the whole of the suburban drainage from the parishes on that side of the Lea, as far almost as the extreme upper end of the parish of Enfield.

553. There was no sewage between those points on the left bank, was there?—There was none. The left bank was then, and is still, a very rural uninhabited country.

554. In the replies which you have given to the Committee, you have stated the amount of capital, both in ordinary stock and in new shares and preference shares of the company; you have no loan capital, have you?—There is no loan capital.

555. What proportion of that capital has been raised since the year 1852?—The capital of the company in 1852 was 675,000 *l.* It is now, I think, nearly 1,400,000 *l.*

556. The capital in 1852 was 675,000 *l.*, and for carrying out those works and works since that time, you have expended about 700,000 *l.* more?—We have.

557. Your capital then has been more than doubled since the Act of 1852, has it not?—It has been.

558. All the things which were required by the Act of 1852 have been carried out, I believe, by your company?—Yes, everything has been done which the Act required.

559. With regard to the state of things at the passing of the Act of 1852, there were at that time certain open reservoirs at Old Ford, were there not?—There were two reservoirs with a united area of 10 or 12 acres.

560. Do those appear on those maps which you have handed in to the Committee?—They do.

561. Up to that period the water used to flow down into those open reservoirs, and was then pumped from those open reservoirs to be supplied to the consumers, was it not?—Yes, the water flowed into those open reservoirs which were made with duplicate apparatus; subsidence was the only means then employed for purifying; they were capable of being used alternately; and, as they were worked alternatively, the water flowed on from them to the engines.

562. Since 1852 two of those reservoirs were thrown into one, I believe, and were covered over?—I have alluded to the large open reservoirs first; there are, also, in addition to those two large open reservoirs, two smaller open reservoirs, which were at that time thrown into one, and covered over; those smaller reservoirs lay intermediately between the large reservoirs and the engines.

563. What was the area of the smaller ones?—They were an acre a piece in their former condition, but when they were united, they became 2½ acres.

564. The water was carried down to those two which were made into one covered

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covered reservoir in an iron pipe, I believe, from the filter beds at Lea Bridge?—After the completion of those works, which ensued upon the Act of 1852, the water was carried from the filter beds to those covered basins direct.

565. You have stated, in the replies which you have given to the Committee, all that has been done with regard to filtration, and the extent of your filtration; has there been any action by any of the parish authorities under the 27th section of the "Metropolitan Water Supply Act," which is the clause which enables the churchwardens and overseers, upon seeing that any house is improperly supplied with water, to compel them to take a supply of water?—No full action has ever been taken under that clause; inquiries have been started which have been replied to and met, and an intimation has been given that the company would use their influence in every way beneficially in seeing that the clause had operation; but without the thing being adversely used, arrangements have been always made, and the parties have been induced, I believe, in all cases, to put up the cisterns which were wanted; in fact, the clause is not a bad one; the clause has been useful. The right of putting the clause in operation has acted sufficiently well.

566. Has there been any application to the company for a constant supply within the terms of the 15th section?—Not strictly within the terms of the 15th section.

567. You have, I believe, in your district, been in the habit of giving a special supply in the nature of a constant supply?—We have given what may be called a continuous supply, if a continuous supply may be described so as to distinguish it in some sense from what is called in the Act a constant supply.

568. In fact, I believe that you give that supply to about 25,000 houses out of about 91,000 or 92,000 houses in your district?—Those are the numbers as reckoned up at Christmas last, 25,000 houses having a continuous supply out of a total of 92,000 houses.

569. Your plan of giving a constant supply is similar, is it not, to that described by Mr. Muir, by having a ferrule inserted in the service-pipe communicating with the house?—It is.

570. And that limits the amount of waste, does it not, that would take place in the house?—It limits the whole amount of water supplied, and consequently limits the amount of waste.

571. Have you given this snpply on a main where there was only one service-pipe?—As the reply is given in the printed book, we have treated the smallest piece of pipe as a district main; any pipe commanded with one cock.

572. There is no definition anywhere of a district main, I believe?—There is no definition of it anywhere.

573. It is a term used for the first time in this Act of 1852, and it is not defined?—It is not defined.

574. In the "General Waterworks Clauses Act" neither the word "main," or the expression "district main" exists, I believe?—There is no definition of the word "main," and consequently none of a "district main."

575. *Chairman.*] Did you make any plan in accordance with the Act, distinguishing between mains and district mains, or did you merely make a plan of your works?—We made special plans containing all the mains and district mains, seeing that there was no possibility of distinguishing one from the other.

576. Then you have not made a plan distinguishing mains from district mains, as required by the Act?—I am not aware that that is the interpretation; I have always imagined mains and district mains to be both required by that clause.

577. The clause says: "shewing the course and situation of all existing mains and district mains;" did you make a plan within the 12 months, shewing the mains and district mains separately?—We had special plans on the printed Ordnance Map of London, bound into a book, and properly made for the use of any one who might call at the office, corrected periodically, and on those maps were shown in distinct lines the whole of the mains, leaving out the services, which would have confused it.

578. Could anybody, looking at that map, have seen the extent of the district main on which his house was situated?—If it had been possible for him to have known what the district main was, he would have seen it immediately.

579. Is there any mark on the plan which would have enabled him to see the extent of the district main on which his house was situated?—Quite so; if it had so happened that he had been on a distinct district main, that is to say, if

he had been on a mere suburban portion, where a main ran out into the country and supplied a certain district that would have been his district main, but within the heart of the metropolis the mains are so grouped together, that it is almost impossible, under any definition precisely, to say what would be a district main.

580. The map was not so constructed as to enable any one to discover which was his district main?—If there had not been a district main which could be said to be appropriated to him, of course he would not have seen it.

581. Mr. *Clerk.*] I think the Act contemplates that the person should have explained to him where the district main is, and where his house is. "Every company, on the application of any person supplied with water by such company, shall furnish to such person the particulars of any district main from which such person is supplied, together with the names of the streets through which such district main passes, and the commencement and termination thereof." Has any application ever been made to you by anybody for that?—I do not think that anybody ever came distinctly to have an answer to that question under that clause; we have had inquiries how the pipes lay incidentally, but not of any precise character.

582. Will you be so good as to describe a little more minutely how it is that you give this constant supply to those 25,000 houses in your district?—The Committee, I think, will understand that at the connection of what is called in the Waterworks Clauses Act the communication pipe (that is the lead pipe which supplies each individual house), with the iron pipe, a piece of metal is inserted with a small orifice in it, which orifice governs the amount that would be discharged into the lead pipe.

583. That would be proportioned to the size of the house, or to the consumption, so as to give a larger or less supply, would it not?—It can be precisely regulated.

584. And it may be so proportioned as to give a quantity of 20 gallons per head to the average number of inhabitants in the house?—With any known pressure, or any given known circumstances, that orifice may be arranged so that the house may receive any quantity.

585. The cistern may be any size that the occupants of the house thought fit?—We put no restriction on the largeness of the cistern; it is rather an advisable thing that they should have cisterns of sufficient size, and that they should not have any influence put upon them to diminish the cisterns at all. We do not recognise any supply without a cistern, and this system is not intended to do away with cisterns at all, but rather to be made to work jointly with the use of cisterns.

586. A cistern would be necessary, would it not, with the use of this small pipe?—Quite necessary.

587. From your knowledge of the east of London, does it appear to you that this is the best mode of giving anything in the nature of a constant supply to a district of that kind?—It does so. Ever since the passing of the Act of 1852, I have turned over in every possible way all different plans and ideas with reference to the supply, and this appears to have become at last the one which is the most feasible and the most beneficial, and the best means of preventing waste among the class of houses and people that we have to deal with.

588. There are 90,000 houses, in round numbers, in your district; are as many as 60,000 of those of a value under 20 *l.* a-year?—Yes.

589. And 20,000 more, I believe, are under 30 *l.* a-year?—That is so.

590. This is not what is commonly called the constant supply?—I think not.

591. But is the district with which you have to deal one adapted for the constant supply in its ordinary signification?—It would be madness to attempt to supply our end of London on a system of constant supply; that is, unlimited control over the water, with a pipe of, say, half-an-inch diameter.

592. The constant supply, as ordinarily intended, means, does it not, lead pipes, brass cocks, and taps in the houses?—It means good fittings. It means a half-inch lead pipe (that is to say, a pipe with a half-inch interior bore), a cistern, and a ball-cock and apparatus, which must be of a good character.

593. With a sort of tenants which the greater number of the landlords have in the eastern part of London, would there be any security that those things would remain long in the houses?—In hundreds or thousands of houses they would be stolen directly, and they would be out of order continually in a great many more.

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594. Therefore, they would require not only supervision on your part to prevent waste, but supervision on the part of the landlord to preserve his fittings? —They would.

595. Because any injury that might take place to the fittings, either by the abstraction of lead or brass taps, would lead to an indefinite amount of waste to the company?—Yes. It not only would do so, but it does do so under present circumstances. Theft of all the fittings is continually going on, and people come to us, holding up their hands and begging us to have mercy upon them, and to relax our stringency in compelling them to have brass taps and ball-cocks on once or twice a year, which we have to do continually.

596. I believe you find that large staffs are necessary to watch repairs at the present time?—Yes; we have a set of men whose special duty it is to examine the condition and report, and enforce the improvement of those fittings throughout. They go systematically through the whole district; and I may add that, go through the district as often as we will, we do not find less than one house in four requiring repairs and improvement.

597. To a great part of your district, are you of opinion that something in the nature of a constant supply of this sort, such as you give now, would be the best sort of thing that could be given to the poor?—I think that is the best sort of thing under existing circumstances; and under the present state of the law, and seeing the difficulty there is in getting landlords to fit houses up properly. The difficulty which exists in getting landlords to supply houses with adequate cisternage in some sense condescends to their bad ways; and this would give the public, and the poor particularly, a better supply of water than they would have with imperfect cisterns under the intermittent system.

598. The storage, I believe, is very deficient through a great part of East London?—Very deficient; 20 per cent. of the houses of the whole district have not anything better than an 18 gallon tub, and out of that 20 per cent. many would have none at all. I think I classified that as one of the points in carrying out the details of the survey which is made by the staff of men which I mentioned a little time ago.

599. A great deal of the water is stored in the bedrooms, and so on, is it not? —It is continually stored in bedrooms and within the house in most objectionable and offensive ways.

600. Since the Act of 1852, and in addition to what was required to be done there, I believe that your company has done a good deal to improve the majority of the water supplied by them?—Beyond the works which were completed in compliance with the Act in 1856, a good deal has since been done.

601. You have bought, I believe, the Walthamstow Copper Mills, and pulled them down?—We bought copper mills and pulled down a good part of the buildings, as far as they were useless, and we bought the Enfield Mills, and we bought land since so as to facilitate the construction of reservoirs.

602. And to prevent obnoxious works being set up which would discharge into the river?—We bought a large estate of land for the sake alone of preventing a factory being built upon it.

603. Have you also, since 1860, established very extensive storage reservoirs at Walthamstow?—Store reservoirs to the extent of 110 acres have been created since the year 1860.

604. What are they capable of storing?—They are capable of storing 220,000,000 gallons, of which 170,000,000 gallons is capable of being withdrawn by gravitation, by the simple opening of sluices.

605. Till the year 1852 your pumping station, I believe, was entirely at Old Ford, was it not?—Not entirely. We had water power at Lea Bridge, but that was only to a small extent. We had no steam power at Lea Bridge.

606. Since that I believe you have established very large pumping power at Lea Bridge?—A very large engine was erected in 1852, and started, I believe, in 1853 or in 1854.

607. I believe that prior to the agitation which took place last year in consequence of the outbreak of cholera in the eastern part of London, it had been the intention of your company to increase the pumping power at Lea Bridge?— It had; it was a resolve which was come to some years ago.

608. And I believe you have recently erected some very large engines there for the purpose of increasing the pumping power at Lea Bridge?—Additional engines are now in the course of erection there.

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609. To the extent of 300 additional horse-power?—Three hundred additional horse-power.

610. I believe in the year 1855 you joined with the New River Company in purchasing from the River Lea all the interests in the water of the Lea, except a certain quantity required for the navigation?—Yes, we did. We joined with them in purchasing all the water of the river altogether I may say, because that which is reserved for the navigation we are at liberty to take if we find them in steam power to perform the navigation, or to pump the water back again.

611. And the rights which you acquired then are defined in the Act of 1855, are they not?—Yes, they are very closely and strictly defined.

612. Mr. Muir told the Committee that the New River Company had the right of taking twenty-two and a-half million gallons at Hertford, and you have the right of taking the same quantity of twenty-two and a-half million gallons at the Tottenham Mills, have you not?—We have the right of taking it any where, I believe, not above the tail of Stanstead Lock; anywhere below a certain defined point.

613. And then you have the power, have you not, also of taking *pari passu* with the New River Company any greater quantity when the river shall be at flood?—We have the power of dividing the river between us to its end.

614. And what shall be deemed to be the river in flood is defined in that Act of 1855, is it not?—It is defined in the Act of 1855

615. I believe you, under that Act, were to give a considerably increased payment to the River Lea to what you gave before?—The payments previously determined upon with the River Lea Trustees were upon a sliding scale. We forestalled the sliding scale, and gave them a definite payment from that time, which was a considerable increase.

616. You now pay them 2,000 *l.* a year, do you not?—We now pay them 2,000 *l.* a year. I believe we shall pay them 2,100 *l.* this year under a certain arrangement.

617. You have mentioned that you have increased your area of storage at Walthamstow to the extent of 110 acres; the cost of that, I think, was 100,000 *l.*?—The cost of that was about 100,000 *l.*

618. I believe that the filtration of your water has been carefully attended to by yourself ever since the Act of 1852?—It has been very carefully attended to; I do not think that any company can have carried out the Act and the duties of filtration in a more thorough and determined manner than we have done.

619. Has a constant analysis of your water been going on by Dr. Letheby for many years past?—Yes, constant analyses have been made by Dr. Letheby, in addition to that supplied by what we call the Government chemist; first, Dr. Dundas Thompson carried it on for a great many years; then Dr. Hofman, and now Professor Frankland.

620. And those analyses have been published monthly, I believe, by the Registrar General?—They are appended to the Report of the Registrar General.

621. Has there been a constantly marked improvement in the analyses of the water since 1856?—There was a very decided improvement when the filtration was carried out.

622. And I believe that your company has kept pace with other Water Companies in that improvement since 1856?—It has, and it ranges very evenly with the other companies; we do not consider our water a bit behind theirs in quality.

623. I believe that the water analysed by Dr. Letheby was not only the water taken by him at the London Hospital, but was also water taken from the works at Lea Bridge?—Yes, I thought there was an object in having a duplicate analysis, and the directors of the company consented to two analyses being made, one of water taken at Lea Bridge, and one of water drawn from the main at the hospital.

624. And that has gone on continually for many years past?—I do not know that the duplicate analysis has been maintained every month, but it has been maintained nearly so until now.

625. The increase of the last 10 years of the annual quantity of water delivered has been about 400,000 gallons per day, has it not?—There has been a continual increase, and I think that it amounts to about 400,000 gallons per day.

626. Concurrently with that, has there been a diminution in the waste of water?—Not to any extent.

627. I think that in the returns you have given there, you have mentioned the quantity

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quantity of water which you delivered in the year 1851 and 1866?—The delivery and the number of gallons are given there.

628. I believe that, until the autumn of last year, your company had taken no steps to give a further increase of supply to your district, except by constructing those storage reservoirs at Walthamstow in 1860?—From time to time the steam power has been increased, but there was no special endeavour to secure a certainty of the presence of water in the river till then. We had treated the river as sufficiently abundant in its running condition for all our need.

629. I believe that, in the year 1864, you found that the supply of water in the Lea was just sufficient, or barely sufficient, for your requirements?—We did so. The year 1864 was such a year as had not been known before. It was the greatest drought within the memory of any one.

630. But in 1865 I believe that there was a sufficient supply of water in the Lea for your purposes?—With the assistance of such storage as we then had there was sufficient.

631. In view of what had taken place in 1864, did your directors determine, last autumn, upon the introduction of two Bills for increasing your supply?—They did; they resolved upon making an application to Parliament for powers to take a supply of water from the Thames in addition to powers for increasing their storage room in the valley of the Lea.

632. You proposed to increase the storage so as to give you 210 acres of storage at Walthamstow, did you not?—Yes.

633. And that would give you the means of storing altogether 500,000,000 gallons?—That would give us the means of storing altogether 500,000,000 gallons.

634. That enables you to supply 10,000,000 gallons a day for a period of 50 days?—It does.

635. Is there any note upon the plan descriptive of the works?—That plan shows the new reservoir distinctly.

636. You obtained the land for your present storage reservoir at Walthamstow, I believe, by agreement; you had no Parliamentary power for it?—We had not any Parliamentary power authorising the purchase of that land, but the estates being in the market, we took the advantage of that circumstance and bought them; but the adjoining lands, which would be suitable, cannot be bought without Parliamentary powers.

637. That would give you a storage supply of 10,000,000 gallons a day for a period of 50 days in aid of the supply which you might be pumping from the Lea?—Yes.

638. Now with regard to the quality; had there been any complaints of the quality of the Lea water as supplied by your company prior to 1866?—There never had been any complaints.

639. In consequence of the outbreak of cholera, I believe there was a good deal of alarm expressed in your district with regard to the supposed effect which certain works at Old Ford might have had upon the increase of cholera in the East London district?—It was so. A suggestion was made that the predominance of the disease there was due to some peculiarity in the water.

640. Now there is a matter which I see is referred to in the Report of the Rivers Commissioners, which is now before this Committee, and which you have seen, I believe?—I have seen it.

641. At the bottom of page 20 there is this paragraph: "Serious charges, however, have been made that the outbreak of the cholera, which in the months of July and August last year, took place in the east end of London, is to be attributed to the water furnished by the company from its reservoirs at Old Ford, whence the suffering districts drew their supply; we did not consider it incumbent upon this Commission to institute a medical inquiry into all the particulars of this special case, though the evidence we received incidentally, bore upon the subject; suffice it to say, that on the one hand the water supplied by the company at this period, from its Old Ford reservoirs, had received an admixture of some unfiltered water, drawn from an open and partially abandoned reservoir, and that on the other hand there were several local conditions, the low level of the district, the use of polluted wells, the saturation with sewage of the sub-soil," and so forth. "Under these circumstances, we do not feel justified in attributing the cholera to any one cause exclusively; but the act of the company in drawing water from the open reservoir for domestic consumption, was unquestionably reprehensible. The company have now entirely cut off all direct means

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means of communication with this source of supply, and we assume that on no future occasion will this water again be resorted to." Would you just describe, if you please, to the Committee what is that matter so referred to, and how it arose?—The proceeding of admitting a certain quantity of water from the uncovered reservoir, arose from a partial, and I may say temporary, deficiency of water in the covered basins, and the water in the uncovered basins being there and then at a higher level and competent to run in, a certain limited quantity was admitted at that time, and there it is.

642. *Chairman.*] Did you give evidence upon this point before the Rivers Commission?—I did.

643. Do you remember particularly the part of the evidence which refers to this matter?—I cannot refer you to the number of the answer, but it occurs in two places.

644. Mr. *Clerk.*] I believe that the last time when any water was ever let in from the uncovered reservoir into the covered reservoir, where the filtered water was, was in the month of July last?—That was positively the last time when any water was let in.

645. And I believe that in the month of September the communication between the open reservoir and the covered reservoir was cut off?—It was entirely shut up, and closed up, and made incapable of further use.

646. It was also suggested, I believe, in the course of last autumn, that there might be a leakage, or soakage, into the covered reservoir from the waters of the Lea?—It was so suggested.

647. I think that you told us that the covered reservoir from which you pump your water at Old Ford had originally consisted of two reservoirs?—Yes.

648. Was one of those constructed entirely in clay?—One of them was, or I may say must have been, because of course it was constructed long before my time.

649. Is that the easternmost or the westernmost of the two?—The westernmost. One is entirely founded or based in clay, or excavated in clay. The greater part of the eastern one is also excavated in clay, but towards its more eastern side the ground in which it is constructed becomes of a less tenacious character, though not altogether different.

650. And that is the part of the reservoir which is nearest to the river Lea, is it not?—Yes.

651. Upon the examination which took place in the February of this year, when that reservoir had been pumped dry, did it appear that there was a certain amount of soakage, or some sort of leakage, in that part of the reservoir which was in the more sandy soils?—On that side there were certain issues of water of no great magnitude, but they were there.

652. I believe that there was nothing of the kind in that reservoir which was in the clay?—There was nothing of the sort in that reservoir which was in the clay.

653. The old communication which was between the two, I think you stated, had been removed; those which had been two reservoirs in 1852, are now one, are they not?—Yes, the ground dividing the one from the other has been removed.

654. *Chairman.*] That is at Old Ford, is it?—That is at Old Ford.

655. Mr. *Clerk.*] Is it your plan now to fill up entirely the reservoir where that soakage was perceived in the month of February last?—That is the plan which is now proposed. In order to avoid any further questions, or doubt as to the soundness or sufficiency of those reservoirs, I propose now to do away entirely with the eastern one, and to fill it up, and to revert to the western one only, which we know to be perfectly sound.

656. And you propose also, do you not, to raise the bed of the other reservoir by about four feet?—By about four feet. That I think is a desirable proceeding.

657. You have there a little sketch, I think, which will enable the Committee to understand it?—This is a pen and ink sketch, which will merely give an idea of what is proposed (*handing a sketch to the Committee, and describing it*); those two prevent the possibility of soakage.

658. Before you can make that effectual, you will require additional filtering beds, will you not?—The use of those reservoirs at present is essential to our daily operation, and therefore I am enabled to do without them; so that to carry out that work it will be necessary for me to be provided with some other means for

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for carrying on the daily work; and as soon as that is completed this operation might be performed.

658*. Then you would have a much smaller area of supply reservoir at Old Ford, would you not, for the purpose of pumping when this is done?—I should have a smaller reserve, but that I must put up with.

659. Would your increased filtering power enable you to give a constant supply though you had a smaller reserve at Old Ford?—The increased filtering power would enable me to do that which I now do by the assistance of this reservoir at Old Ford, and more.

660. But with increased filtering capacity, you could diminish your supply reservoir at Old Ford, could you not?—Yes.

661. Mr. *Henry Baillie.*] What was the nature of the leakage which came in, was it impure water?—It was perfectly bright, and perfectly inodorous; and on being analysed it was pronounced by Dr. Letheby to be quite good.

662. Mr. *Clerk.*] They were taken and analysed?—The three samples were taken and analysed by Dr. Letheby.

663. I think that they were not analysed by Dr. Frankland?—I think that they were not analysed by Dr. Frankland; three large jars were immediately sent off to Dr. Letheby for analysis.

664. Those who acted on behalf of the memorialists, I believe, took so small a quantity that Dr. Frankland was unable to arrive at any conclusion from it? —That was so.

665. It has been suggested that there might be some connection between the spread of cholera and the supply from the Old Ford; was it a fact that during last autumn a part of your district which was entirely free from cholera, drew its supply exclusively from Old Ford; It was so; there were three distinct portions of the district which were known positively to be exclusively supplied from Old Ford, which were perfectly untouched by the disease.

666. And in those parts where the cholera was most rife, I believe the supply came as much from Lea Bridge as it did from Old Ford?—I can hardly say that; I think that the allegation was correct that the greatest virulence of the disease was in a district probably supplied by Old Ford.

667. But there were other parts of that district solely supplied from Old Ford, were there not, where there was none?—That was so.

668. But are there other parts of the district supplied indifferently from Lea Bridge and Old Ford?—There are. There is a variable line on either side of which the source of supply cannot be from day to day known.

669. It was in contemplation, I believe, last autumn to have extended your system of intercepting drains, was it not?—It was, and up to a recent time that was the plan which we thought most desirable for attaining a higher degree of purity in the valley of the Lea.

670. Any intercepting drains which you could have constructed would have interfered with only a very small part of the injurious matter flowing into the Lea, I think?—We did not propose to go to any very great distance. It was not a general scheme for the whole valley, and would only have operated on the parishes adjoining those on which the previous works operated.

671. This report of the Rivers Commission proposes, does it not, that the Lea should be dealt with in the same way as the Thames in 1866?—It does. The Report of the Rivers Commission is a very excellent report, and advises that a thorough action should be taken throughout the whole valley for the prevention of nuisances in the river.

672. And that the Board should be constituted especially a Conservancy Board for dealing with the management of the Lea, in the same way as the Thames has been dealt with?—In the same way as the Thames has been dealt with under the Act already passed.

673. I believe, besides that Report of the Rivers Commission, many of the parishes had taken action last autumn with a view of getting a more complete system of drainage for the whole of their district?—It is so. Joint meetings have been held by the parishes most interested in this question in the lower part of this valley, and measures have been, to a certain extent, set on foot; such as the obtaining of a report upon the matter from an eminent engineer, Mr. Bazalgette, the engineer of the Metropolitan Board of Works, as to the best way and means of meeting the difficulty which is growing on those parishes.

674. Many of those parishes were, I believe, active opponents of your scheme of

intercepting drains, as proposed in the present Session?—They have petitioned against us.

675. And I believe considering that yours could be only a small dealing with the question, and inferior to that which is proposed here by the Rivers Commission, it no longer forms a part of your scheme before Parliament in the present year?—We did not consider it desirable to maintain that design and scheme, because in all probability it would interfere considerably with any general plan.

676. You have there in connection with that scheme of extended intercepting drains, a plan of constructing works for deodorising, have you not?—Yes; certain lands were scheduled in the Bill, on which it was possible to construct works or arrange works for the purification of the water, or for the diminishing of the nuisance.

677. That met with a good deal of opposition, did it not, from the different parishes of Tottenham, Enfield, and others?—It did, and also from local landowners, who do not wish the establishment of such works to take place.

678. And that you have also abandoned in consequence of this report?—That we are bound to drop with the others, under the hope and full belief that a more complete scheme will be adopted.

679. There is a matter which I see referred to here in a paper, to which the honourable Chairman has called our attention to-day, which I think has been sent by the Registrar General. It is at page 7 of that paper, with regard to a suggestion of Dr. Frankland's, that the companies should make use of animal charcoal for the purpose of filtering their water. That is a matter which you have a good deal considered, I believe?—I have considered that matter as far as my knowledge and information on the subject would go.

680. The words are these: "I would, therefore, most earnestly recommend, that during the prevalence of cholera the whole of the water supplied to the metropolis should be passed through animal charcoal immediately before transmission to consumers from the reservoirs of the respective companies. For this purpose 300 tons of bone-black, in the condition in which it is used by sugar refiners, would be required to purify the total supply of the metropolis, as I find that water passed at the rate of 1,000,000 gallons in 24 hours through three tons of bone-black is completely purified. This operation, even when performed upon the water supply of London (100,000,000 gallons daily) would be neither formidable nor expensive. Three or four days would suffice to fix the necessary filtering boxes, whilst the animal charcoal, being an article which is now manufactured on a very large scale, can be had on the shortest notice. It is scarcely necessary to add, that the water should be passed through the animal charcoal after it has undergone the usual process of filtration." At present I believe that filtration by animal charcoal has only been used in the consumer's house?—I am not aware of its having been used in any public way for the purification of water.

681. Practically, in order to use animal charcoal for the purpose of further filtration of water, would it have to be laid down on a filtering bed?—At present I am of opinion that that is the only way in which we could apply it; but the ideas on the subject at present are altogether speculative; we have no practical experience to guide us in any way in using it, nor as to its efficiency, excepting in laboratory experiments.

682. What is the average quantity of water which you filter in a day?—The whole supply is 19,380,000 gallons, which is given as the quantity taken in 1866.

683. At the present time we may take it at 20,000,000 gallons a day. It is suggested here I see by Dr. Frankland, in this report, that in three or four days you could fix the necessary filtering boxes to hold the animal charcoal. As a practical engineer, do you see your way to fixing boxes to hold animal charcoal to filter that quantity of water?—I have not the remotest idea of any method or form in which we could carry out such an operation, or fix them. In fact, I think that Dr. Frankland himself has not a very clear idea of the magnitude of the stream of water which makes the 20,000,000 gallons a-day.

684. At present, I believe, the charcoal is packed in a box, and the water passes from the cistern through the box?—Inwards, or outwards, I do not know which; but a cistern, or some square receptacle is the only method, I believe, which has been yet adopted for carrying out the process of charcoal filtration.

685. Supposing that the charcoal had to be spread out on a reservoir, as you spread the sand for filtering, would it require a very large quantity of charcoal?—

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The quantity of charcoal required so as to get any appreciable result, and so as to get any proper action by it, would be immense.

686. The water must be in contact, must it not, for a considerable space of time with the animal charcoal?—We have been informed by both of those chemists who gave evidence before Captain Tyler, that a certain duration of contact was necessary in order to produce any effect.

687. At present I may take it that this use of animal charcoal has not gone out of the region of experiment, or of use, merely for domestic purposes?—It has not gone beyond that.

688. And the mode of using animal charcoal by a Water Company for the purpose of purifying their daily supply has never been publicly put forward yet by any one?—No proposal has yet been made by any one for doing it.

689. Except this vague suggestion of Dr. Frankland's, that the necessary filtering boxes may be put in in three or four days for all the companies of London; at page 19 of the Report of the Rivers Commission, it is stated, "Charcoal filtration has been tried experimentally, but, supposing it to be practically successful, the engineer estimated that it would cost the company not less than 94,000 *l.* if permanently adopted, and that this would be too great an outlay." That is the cost for one company, 94,000 *l.*, and then, of course, how long this charcoal would be serviceable, and how often it would have to be renewed is a matter upon which there is no experience at the present time?—It is a matter upon which there is no experience.

The *Chairman* intimated that this was a point which need not be pursued.

690. Mr. *Clerk* (to the *Witness*).] I asked you as to how you proposed to deal with the covered reservoir, so as to get rid of any soakage, but with regard to the uncovered reservoirs, the connection is now cut off with the covered ones, and you propose to fill them up?—We propose to fill them up if we can get power to excavate this additional reservoir, or can acquire some other means of getting material, but unless there are some means to fill them up, it is not very easy in the valley of the Lea to fill up such reservoirs without digging a hole.

691. They have created alarm, have they not?—They have created alarm, and, as they are of no use, it is as well to get rid of them, and convert them into solid land.

692. There may be an alarm, on the part of the public, that you might use the water which would be in them?—Yes, but we should not use it.

693. Mr. *Henry Baillie.*] If this is an unfounded alarm, why should the company go to the expense of filling them up?—Because they are of no use; they are but dead water.

694. *Chairman.*] It is not desirable to have a stagnant pool there if you do not want it?—Quite so; and the land, as land, would be useful for other purposes.

695. Mr. *Henry Baillie.*] Cannot the company use them still?—No; we are forbidden to use them entirely. The Act forbids us to do so since 1855.

696. Mr. *Benyon.*] You are prevented from using them, unless they are covered over, and you do not wish to incur the expense of covering them over? —They are not worth covering over.

697. Mr. *Clerk.*] I believe that they would be filled up, with the exception of so much as would be necessary to receive the overflow of your filtered water?—That would be the only use to which they could be applied. None would flow back; but, to contain a small quantity of overflow, which might casually happen from the covered reservoirs, it is necessary to have a small basin.

698. That would pass into the Lea?—It must be pumped away. It cannot flow.

Cross-examined by Mr. *Cripps.*

699. Before we leave that, do you state that that reservoir never has been covered over?—It never has been covered over.

700. Then was that out of the operation of section 2 of the Act of 1852?—It was disused, it was no longer a reservoir; it was there, and being there, it may be called a reservoir, of course, but it was not a reservoir in the sense of the Act; it was not a part of the system of works.

701. Did it hold water?—Yes, it held water.

701*. Then you do not consider that as coming within the second section, or you did not so treat it at any rate?—Not at all.

702. Is that the reservoir which Dr. Frankland alludes to in this way: "I was astonished to find that the water, after being carefully brought down from Tottenham Mills in a special canal, purified by a most elaborate and efficient system of filtration at Lea Bridge, and then, to secure it from atmospheric impurities, conveyed in an iron main down to Old Ford, is stored in a reservoir sunk to the depth of some 16 feet beneath the low ground, which is here only just above the level of spring tides, and that when the reservoir is full the level of the surface of the water in it only reaches that of Trinity high-water mark. This reservoir, as I was informed, is excavated in clay, but the side next to the navigation branch of the foul River Lea is of gravel; no doubt this is well puddled and the brickwork sides executed in the best possible manner; nevertheless the position of this reservoir with its two and a-half acres of floor 16 feet below the surface of a badly-drained district, is fraught with much peril during the prevalence of epidemic disease. Whetever precautions may have been taken, soakage, to some extent, must take place into such an excavation; and it was stated to me, that when the reservoir is emptied, such soakage water, though not in large quantity, has to be removed by pumping"?—That is what we are now calling the covered reservoir.

703. Was that a reservoir from which you were then taking water?—That is the reservoir from which we were then and are now taking water.

704. You do not agree, I suppose, in those conclusions of Dr. Frankland's about it, that the soakage took place into it?—We admitted just now that when it was pumped out by Captain Tyler, certain small issues of water were found on the lower level on the river side of that Old Ford reservoir.

705. This reservoir, with its 2½ acres, was covered over, was it not?—It was covered over.

706. And that is the one which you now propose to abandon?—We propose to abandon one-half of it. We propose to abandon the part to which he alludes with an objecting remark.

707. He does not divide it at all here; he alludes to the whole reservoir, does he not?—Yes, he divides it distinctly. This is a sketch sufficiently near to show what is meant (*describing the same*).

708. Is that the 2½ acres?—The 2½ acres means the whole; there is not two acres of floor, or much more than an acre and-a-half.

709. Then when Dr. Frankland mentioned this: "No doubt this is well puddled, and the brickwork sides executed in the best possible manner, nevertheless the position of this reservoir, with its 2½ acres of floor 16 feet below the surface of a badly-drained district is fraught with much peril during the prevalence of epidemic disease," that refers to both the reservoirs, does it?—It may be said so to do, but there can be no objection to that reservoir, because it is in solid clay.

710. *Chairman.*] Does the plan which you sent in show more accurately the reservoirs?—I do not think it does. I do not think that any plan has been submitted which shows it more distinctly. This sketch distinctly gives the idea, although it is not a very well made plan.

711. Mr. *Henry Baillie.*] Dr. Frankland calls it one reservoir, but in point of fact it is two?—Yes; they are all one at top, and two at bottom.

712. Mr. *Cripps.*] Then you intend to retain one of them, and to fill up the other?—That is the intention.

713. Now, with regard to what you told us in the earlier part of your examination, you say that the poor people in your district store a considerable quantity of this water in tubs in their bedrooms, or anywhere that they can?—I do.

714. That of course is objectionable, and the water so stored would become objectionable?—It would become warm, and polluted, and offensive.

715. Why do they store that water in that way; would it be necessary if there was constant supply and constant pressure?—It would not be necessary to store water if they had unlimited means of drawing immediately from the mains all that they wanted.

716. It is one of the evils which arises from the want of a constant pressure system, is it not?—You may attribute it in that way.

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717. Mr. *Henry Baillie.*] Or from the insufficient size of the tanks?—It is from the general bad adaptation of the residences of the lower orders. They have not sufficient back courts or proper places for putting their water in. The landlords will not erect for them the proper means, and they steal from one another. Their tubs and taps and everything are stolen by rovers of the public, and the only way in which they can store the water is by putting it under their beds, or anywhere they can. It is one of the most lamentable things which can be seen.

718. Mr. *Cripps.*] The present system is as bad as it can be, is it not?—It cannot be much worse, but I will not say that it is as bad as it can be.

719. Supposing that instead of those tubs and things they had large cisterns, would they be cleaned out continually, or would they remain foul?—Any cistern ought to be cleaned out periodically.

720. Would it not be extremely probable that they would not be cleaned out, but that they would become foul?—Even in the houses of the rich they become so.

721. And still more so in those poorer houses?—I do not know about that; I think that the people who are well off are just as careless in those matters as the poor; we know hundreds of houses where the covers are never lifted for years together.

722. And that is an objection to the system generally, is it not?—No, I do not think it is.

723. Why do you suppose it more likely that if proper fittings were put into dwellings of that kind they would be stolen or taken away than if there were fittings for cisterns?—The fittings of which I spoke are fittings for cisterns, not fittings without cisterns.

724. Assuming a constant supply with or without cisterns, why should the fittings be more likely to be stolen if there is constant pressure upon them, than if they are fittings without constant pressure upon them?—I do not know that any proposition is before us, or before the world, or before the Committee, for putting on a constant supply without any cisterns.

725. Can you suggest any reason why a fitting or a tap with constant pressure should be more likely to be stolen, than where there is intermittent pressure?—None at all; the fittings are equally liable to be stolen, whatever the purpose may be.

726. If there was constant pressure on the tap, if they stole the fittings they would be flooded, would they not?—If there was no cistern, of course the stealing of the tap would necessitate flooding.

727. And if a theft were committed under those circumstances, it would be more readily detected, would it not?—The first operation would be, to beat the end of the pipe up.

728. You spoke of this system being as bad as it can be, what would you suggest as a remedy, would you suggest that landlords generally should be obliged to put proper fittings in those houses?—It is a very difficult thing to know how to tackle the question.

729. It is so for us, but you have considered it, have you not?—I have considered it in every way, and the only conclusion I have come to, not only with reference to the water supply, but to many other things is, that every house should be licensed for habitability by proper officers and under full control, and that no house should be competent to be inhabited, unless it were in a certain condition, and that if it were not, some officer should put a red mark on the door, and turn the people out.

730. And part of that condition would be that it should be fitted with proper fittings for the supply of water?—Certainly.

731. Up to the present time, under the 27th section of the Act of 1852, the churchwardens and overseers may, if they please, take action in a case where they think the water is required, may they not?—They may.

732. Within your experience is that frequently resorted to, or is it very rare indeed?—It is very rare indeed, and it is inoperative.

733. Then I adopt that word; the section is practically inoperative?—It is.

734. *Chairman.*] The churchwardens and overseers under the present system really have nothing to do with the matter, have they?—You will no doubt be better aware than myself that other Acts have taken up those duties. The Local Management Act has clauses which go down as low, I think, as 2 *d.* per week.

735. But

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735. But probably the churchwardens and overseers now have nothing to do with the state of the houses?—No doubt.

736. Mr. *Cripps.*] If a house of this class, or if, indeed, any house is not properly supplied with water, it may be a nuisance to the neighbouring houses as much as to the house itself, may it not?—It is possible.

737. And it is probable, is it not?—We know it is the case that a great many houses are insufficiently supplied; but the neighbours may not feel the nuisance, or may be indifferent to it. They are all alike, most probably. These cases do not happen in an isolated manner; they happen by scores together.

738. You say that the 27th section is practically inoperative, and that it is desirable that all houses should be supplied with water; would it not be desirable, in your opinion, that section 27, or something of the kind, should be made more general, and that all parties should be obliged to have a supply of water in their houses?—Something more is wanted to put some machinery in motion towards it, but I cannot say what.

739. In point of fact the Act of 1852 wants, in some way, to be extended and made more stringent in that respect, does it not?—The Act of 1852 limits the duties of the Water Companies. It is not incumbent upon the Water Companies to do this; it is a local management question, rather than a Water Company's question.

740. That may be so, but I am asking you as a person of experience of this matter what you would think of it, whoseever duty it should be, would it be desirable, in your opinion, to have a more stringent and more general power than there is in that Act for that purpose?—Certainly. There was legislation last year with respect to lodging-houses, by which the medical officers and surveyors of parishes can compel lodging-houses to be fitted out with cisterns competent to give, I think, 10 gallons per head per day for all the inhabitants of the house, but that does not refer to houses in general, but is limited to lodging-houses, and it has become rather a question as to what is a lodging-house.

741. *Chairman.*] Has the question arisen whether it is a lodging-house licensed under the Act?—Whether it is a lodging-house licensed under the Act, or a house in which a man may let his front room to a lodger. Some of the parishes in the east end have taken the view that a house, any part of which is let off to lodgers, is a lodging house.

742. And it comes under the Act?—It comes under the Act. It is not a good interpretation, of course, and may lead to confusion and trouble.

743. Mr. *Cripps.*] You are not aware of any Act subsequent to this which relates to houses generally, compelling them to take water?—The Local Management Act is subsequent to that.

744. You have spoken of what you call a continuous supply, which you have furnished to as many as 25,000 houses?—Yes.

745. Do you mean by continuous supply, a constant pressure upon the tap, so that at any time the party who has the tap can turn the water on?—The continuous supply is at the ball-cock; the moment the water is drawn from the cistern the ball-cock drops, and the cistern replenishes itself.

746. Then in those cases there is a constant supply, when the party goes to the tap that supplies his house?—Yes.

747. Have you found in experience, that there is any very great waste under that system?—I have checked the waste by limiting the orifice through which the water is drawn, but if that check were not there, I have experienced that the waste would prohibit the adoption of that system.

748. Any check of that kind is possible with constant pressure, is it not?—Yes.

749. *Chairman.*] That is the system which is in force with 25,000 houses, as I understand?—Yes.

750. Mr. *Cripps.*] I understand you to say that there is no waste when that system is adopted?—I do not say that; there is waste under any system, unfortunately.

751. But I mean, of course, any much greater waste than in the ordinary case of supply by cisterns?—There would be no greater waste under that system than under the ordinary intermittent supply.

752. *Chairman.*] What I understand is, that knowing the pressure of water, and regulating the diameter of the orifice, you can beforehand determine how much water will flow into the house in 24 hours?—Exactly.

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753. And therefore you so regulate the diameter of the pipe, with reference to the pressure of the water, that you deliver into the house the quantity which you determine beforehand shall be supplied to that house, whether it is used or not, and if it is not used it will run to waste?—If it is not used and not wanted the ball-cock is presumed to shut it off altogether.

754. But if that is not in good order, then it runs to waste, does it not?—The adaptation of a constant or continuous supply to a house is only carried out, pre-supposing the absence of a waste pipe. You will find that this same Act, and all the Acts that have any reference to constant supply, prohibit the use of a waste pipe.

755. Then in your case you leave the waste pipe?—No, we take away the waste pipe. That is one of our great safeguards.

756. Mr. *Cripps.*] With that system it would be necessary to have a cistern of some sort, would it not?—Yes.

757. And then the cistern would fill, and the ball-cock would be up in the ordinary way, but as the cistern was emptied, if it was emptied, the water would flow in continuously to the cistern without waiting till the next morning?—Yes.

758. *Chairman.*] It averages the supply to the level of the ball-cock?—Yes, the ball-cock works precisely as it would in a daily supply.

759. Then if the cistern be in a place where it would overflow without danger in a back yard, or with a sink underneath the cistern then would simply overflow at the edge?—It would, but constant inspection is necessary, and therefore you must presume on certain cases of premises being out of order; and they would come in for the next visit of the inspector.

760. But such an overflow as that would be easily detected, would it not?—That would be easily detected.

761. Mr. *Cripps.*] Then what you mean by a continuous supply is a continuous supply to the cistern as fast as the cistern is emptied, instead of an intermittent supply to the cistern?—A continuous supply to the cistern as fast as the cistern is emptied.

762. And that system you have not found injurious to you as creating any greater waste than the ordinary ball-cock cistern?—No; I am contented to go on to any extent on that system in our district.

763. *Chairman.*] What is the difference between what you describe as your continuous supply, and what is technically understood by constant supply?—The difference between the two appears to me to be very small; the thorough going constant supply is merely a half-inch pipe from the company's main in the street to the cistern without any contracting orifice, so that a tenant or consumer is at liberty to draw all that the half-inch pipe would deliver.

764. Mr. *Cripps.*] But in the continuous supply system the tenant would be at liberty to go on drawing as fast as he pleased, would he not?—But he is limited by the size of the orifice.

765. *Chairman.*] The difference is this, that in one instance there is a half-inch pipe universally, and in the other case there is the pipe with a diameter proportioned to the intention of the company, or the need of the consumer?—Yes.

766. Mr. *Cripps.*] Then in point of fact is the dimension of the pipe the regulating ferrule?—The orifices are eighths or sixteenths, and sometimes smaller. That is the size of the orifice in the ferrule. The pipe may be the same as it would be in any case. There is no reason why a pipe should not be half-an-inch in diameter, but this plate or ferrule is inserted in some convenient portion of it, generally in the street close to the iron pipe.

767. Then would the main difference between your term of continuous supply and the constant supply be the intervention of the cistern in the one case, and not in the other?—I imagine there would be a cistern in any case. There is no Act referring to this matter, which at all supposes the absence of a cistern.

768. Then in that case the difference is rather a difference in name, is it not?—It is a difference of name, but it is advisable to use a different name.

769. *Chairman.*] It would seem that the one is a regulated constant supply, and that the other is an unregulated constant supply?—Yes.

770. But I thought there was a third scheme, viz., that of a person not having a cistern?—There may be of course a constant supply, and no cistern at all, but then how is the water-closet to be managed.

771. I am rather asking you whether you can explain to me what is a constant supply without a cistern ?—

772. Mr. *Cripps.*] The ordinary constant supply does not have a cistern, does it ?—I believe so.

773. Do you know how it is managed at Glasgow, for instance ?—I do not know that at all.

774. *Chairman.*] If there is a constant supply, without a cistern, I presume it would require a large pipe to deliver the water into a house, so that when ever a person turned a cock he could turn off as much water as he wanted ?—It must be a very large bore to suit all the conveniences of a house where there is no cistern, and consequently the liability of the company to lose by waste would be greatly increased.

775. How would there be any increase in that respect ; if there were no waste-pipe underneath to draw off water if it ran to waste, where would the waste be ?—It would go some way into the drains and sewers.

776. Supposing the cock from the pipe is a cock, for example, in the kitchen, without any sink underneath, where would the waste be ?—Then I admit that there would be good security against waste.

777. Or if it were in the attic of the house there would be perfect security against waste ?—Yes, we hear those terms used, but we do not get any definition of them.

778. Mr. *Cripps.*] When you ordinarily speak of the constant supply system, you do not think of cisterns, except for the purpose of water-closets, or matters of that kind, do you ?—I hardly know. One is so much in the habit of using additional words to make one's meaning clear, that one does not often speak of a constant supply without something which would further define it.

779. There are a number of towns with a constant supply system, as you know ?—Yes.

780. Is it unusual and exceptional in those towns with the constant supply system, to find cisterns at all, except for the purpose of water-closets ?—I cannot say ; I am not sufficiently acquainted with those towns to be able to answer the question.

781. You do not know, then, whether it is considered to be one of the advantages of such a system that they can get rid of cisterns, and so prevent that accumulation of filth in cisterns, and that fouling of the water which you told us just now is inseparable from the cistern system ?—I do not know it fully. I know that there are towns in which the cistern for the water-closet is the only cistern used.

782. *Chairman.*] Are there any houses in your district where the person draws water for his consumption, without the intervention of a cistern ?—It is my desire that there should be none ; we do our best to prevent them ; we do not recognise the laying on the water without the intervention of a cistern.

783. Mr. *Cripps.*] Then when you speak of a continuous system, you speak of water supplied to a cistern, and from that cistern to the consumer ?—Exactly.

The *Chairman* stated that it would be desirable, if the question of direct supply was to be raised, that evidence should be given as to whether it would be practicable with the present arrangements, and he requested that Mr. Muir might be recalled with regard to the supply of Glasgow, Manchester, and other towns.

Witness.] It is not every engineer who has Loch Katrine at his back.

The Witness withdrew.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Thursday, 16*th May* 1867.

MEMBERS PRESENT:

Mr. Ayrton.
Mr. Sclater-Booth.
Mr. Benyon.
Mr. Henry Baillie.
Lord John Hay.
Mr. Headlam.
Colonel Hogg.
Lord Frederick Cavendish.
Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

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THE *Chairman* stated that he was desired to intimate that it would be convenient that the whole of the evidence which Counsel proposed to lay before the Committee, with reference to the River Lea system of supply, both in the metropolis and elsewhere, and as regarded its sources and means of supply, should be completed before anything was gone into with reference to a supply direct from the Thames, or from other sources. And that as there might be some difficulty in obtaining a quorum on Monday next, the Committee would, after to-morrow, adjourn till Tuesday next, and proceed then with the Various Powers Bill.

Mr. *Charles Greaves* recalled; and further cross-examined by Mr. *Cripps*.

Mr. C. *Greaves*.

784. CAN you tell me whether the constant supply, or the constant system, are terms well understood or to be explained by you as a water engineer, and whether they mean a supply with the intervention of cisterns, or without them? —I cannot answer that quetion simply indefinitely; a constant system means that the pressure shall be always in the pipes, down to the house in which the water is to be consumed, but I do not think it has ever been settled whether it should mean with a cistern or without it.

785. If you find those terms used by persons who understand the question, that would leave it open whether it was intended to have the intervention of a cistern or not?—We read the "Metropolis Water Act" as implying that there should be a cistern in every case.

786. Generally, as an engineer, how do you understand the term?—I say that I cannot answer that question definitely; it would require a further question for elucidation.

787. I will just call your attention to the Report of the Commissioners for the Prevention of Pollution of Rivers. The last paragraph in their recommendations is, "That legislative measures be passed to render it compulsory upon each company to supply water, upon the constant system, throughout its district, and upon owners of houses to furnish their houses with proper arrangements to receive such supply." Should you understand that recommendation, or would it require something more to convey to your mind what that is intended to apply to?—It requires to be further defined.

788. But it would go to the end, would it not, that all your mains and district

mains should be charged at full pressure?—They are now; the mains and district mains are all charged with full pressure perpetually.

789. Is there a charge at full pressure to all the pipes, except the service pipes?—All.

790. At all times?—Yes; except when repairs are required, or special shutting down for particular works.

791. Suppose that in a house the ball-cock was put down at any time in the day; would there always be a supply of water forthcoming?—Not for houses on the intermittent supply.

792. You do not mean that all your mains are charged at full pressure?—We shall get into a difficulty again about the meaning of the word "main," I am afraid.

793. Take everything except the service pipe to the house; the mains, the district, and sub-district mains?—If you use the language of the Act, it is clear that the pipe that enters into the house is the communication pipe, and not the service pipe; the pipe between the main and the communication pipe is the service pipe, and then there are the mains.

794. Except the communication pipe, you do not mean to say that all the others are always charged?—No, certainly not; the services on the intermittent supply are only charged during the time of the supply.

795. Assuming the constant system as spoken of in this Report to be adopted, then all the pipes, except the communication pipes, would have to be charged at full pressure?—Yes; that is precisely the difference.

796. Tell me, with the constant system, up to what point in your pipes the pressure would always be existing?—Up to the ball-cock of the cistern.

797. Therefore, the constant pressure system would be that all the pipes and communication pipes would be always charged?—Yes; they would be always charged under the constant system.

798. That is not so under your system, except in those exceptional cases of houses which you mentioned yesterday?—The 25,000; in those 25,000 the pipes are fully charged up to the ball-cocks of the cisterns.

799. But excepting in those it is not so?—Yes.

800. Again I refer to the Report of the Registrar General, with regard to a matter that you spoke of yesterday, the water pipes; it is in these words: "Whoever will take the trouble to go among the people now suffering in crowded dwellings will see the danger of the water-butt; poor women are washing the dirty linen of patients with water drawn from those vessels, which are often found close to the water-closets. It would be a source of additional safety to London if the tanks and butts were all abolished, and the pipes were filled on the system of constant supply. The time has come for this reform." That must mean also, all pipes being charged at constant pressure, communication pipes and all?—Yes.

801. Some evidence was given to the Committee of the cost which any alteration would occasion to landlords by changing the present system to the constant system of supply; have you considered what that cost would be?—Yes, I have considered the cost, but I should rather wish to be excused from naming one which would fit all London, as the East London district is so different from other parts.

802. Take your own district, and assume that in houses of the class you supply, there was a tap, and a constant supply to that tap, what would the cost of it be to each house?—I do not see how it could amount to more than 2 *l.* a house.

803. Would it amount to so much as that?—I doubt whether it would; I think it would leave a good margin.

804. Would the cost exceed 1 *l.*?—Assuming the pressure to remain as now given in the district?

805. I am assuming that there is a constant pressure up to the tap, and that the tap and communication pipe to the house are in a state that water could be always drawn; I mean an alteration that should put the tap in that condition without the intervention of any cistern?—There would be no water for the water-closets.

806. I apprehend that in the house I allude to, water-closets would hardly be found?—We do not find that to be so.

807. Put the water-closets aside; assume the water-closets to be supplied by a system

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a system on a different principle, and that the landlords had the expense of putting such a tap in connection with the communication pipe as shall always be ready to draw off the water at a constant pressure, would the expense exceed 1 *l.* ?—I do not think that it would be wise to put it so low, because we should use the opportunity for enforcing a better condition of cisterns, and better apparatus all through.

808. I am taking it now as the case without a cistern?—I can hardly give you a fair answer; I think that there is very little doubt that in the majority of our districts the water-closets use two-thirds of the domestic supply of water.

809. Omit the question of the water-closets, and assume the state of things that I put to you, with a simple tap; what would be the expense of that?—I dare say it might be done for 20 *s.* if the water-closet question could be separated from it.

810. Is it possible to have the water-closets, if required, supplied differently from the cistern, with a ball-cock, in the usual way, and a cistern for the water-closet?—Yes, it can be done, and it is done.

811. So that the water-closet question need not necessarily affect the other question?—A separation might be effected between the two.

812. Mr. *Headlam.*] I did not understand what you said with regard to the intermittent system. I think you said that there is both a communication pipe and a service pipe?—On every system the whole set of pipes may be divided into three: the mains, the services, and the communication pipes; the mains are always charged; the service pipes will be always charged on the constant system, but only intermittently charged for certain hours and minutes in the day on the intermittent system; the communication pipes will follow the service pipes, and be constantly charged with the service pipes on the constant system.

813. To how many houses does one service pipe apply; and is there one communication pipe for every house?—There are 30, 40, 50, or 60, according to the circumstances and size.

814. What degree of labour is required in putting on water on the intermittent system; how many cocks have to be turned to cause the supply to come into the different houses?—Only one cock is required to be turned.

815. For how many houses?—It may be for 30, 40, and from that to 60, according to circumstances.

816. It would be one turning of the cock for as many houses as the service pipe applies to?—As many as are on the service; one cock commands that service, and up to that cock there is a constant pressure. I may say that that cock regulates that number of houses.

817. How does the service pipe run; is it parallel to the houses?—Yes.

818. Parallel to the main pipe?—If there is one, it is probably parallel; but in a branch street, without a main, it would be at right angles to the main in the next street.

819. *Chairman.*] I think, now we understand, that the service pipe and the district main, mentioned in the Act of Parliament, must be one and the same thing?—I have interpreted the service pipe and the district main to be the same thing; but I think I am going a little on one side of the interpretation intended. I think by the Act it was intended to give a larger geography to a district main than I have given to it.

820. Mr. *Kekewich.*] I do not think the words "service pipe" are used in the Act?—No.

821. There are "communication pipes," "mains," and "district mains"?—Yes.

Mr. *Cripps.*] We assume that the district main and the service pipe are mains for the same thing.

Chairman.] They would be according to this definition.

Mr. *Cripps.*] He gives a new name to the pipe called the "communication pipe," that comes into the house.

Re-examined

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Re-examined by Mr. *Clerk.*

822. The "communication pipe" is a term used in the Act of 1857?—In the "Waterworks Clauses Act."

823. That (*handing the same to the Witness*) would represent, would it not, a section of what you would call, practically, a service pipe?—Yes, that is what we call a service pipe.

824. *Chairman.*] Is that a 3-inch pipe?—Yes, and that has a connection with the house; the main is larger than that, and one cock stands between them and the main.

825. Mr. *Clerk.*] It is to the service pipe that the communication pipes are attached?—Yes.

826. As a rule you do not attach communications to either the large or the small mains?—No; not as a rule.

827. We sometimes speak of a house being on the main, and in that case some houses are supplied by meter with larger quantities of water directly from the main?—Yes; but the expression "on the main" is an old fashioned one, and before the expression "constant supply" became a common one, people used to talk about being on the main, or getting on the main, and they thought it a fine thing to have an opportunity of pulling away as much water as they chose.

828. That little section shows the mode in which the communication pipe is attached?—Yes.

829. When you give that modified constant supply, which you do give in your district, I believe, it is at the connection between the communication pipe and the service pipe that you put in the controlling orifice?—Yes.

830. When you use that system, I believe, there is no limit to the size of the cisterns or the receptacles in the house?—No limit is imposed by the company.

831. The owner might put in any sized cistern he liked, so that if the pipe was running all night, there might be a considerable quantity of water in the house; more than 20 gallons per head?—My desire is that every house should have a 40 gallon cistern. We try to lead them to that as much as possible, and if a man was asking to have water laid on to a house with no more than a 10 gallon receptacle in it, I should refuse to do it.

832. Suppose there was a change, as suggested this morning, in the whole of the East London district, you stated that the cost to the owner of making the change would be on the average about 2 *l.* a house?—Yes.

833. Would that outlay include a change of the leaden pipe, a fresh communication pipe, and other fittings?—It would merely apply to a change of some part; the communication pipe, and an improvement of the ball-cocks and draw-cocks; in many cases a new cistern, and complete apparatus, would be required, while in other cases the existing apparatus would be sufficient.

834. Without such a change as this, from having no ball-cocks to the cisterns, and no taps, would there not be a certainty of flooding in the houses if the constant system was now adopted?—Certainly, if the waste pipes were removed, there would be great flooding, inconvenience, and enormous waste.

835. Which would produce great dampness and unhealthiness in the houses?—I have no doubt it would be very prejudicial in the houses.

836. Was not that pointed out by one of the medical inspectors in the east of London, Dr. Liddell?—Yes, it was.

837. Supposing this change to take place of giving a constant pressure by means of taps in the houses, would it still be necessary to have cisterns as well in the majority of those houses?—I do not at all see how water supplied on the constant system can be worked without a cistern.

838. In the larger part of the east of London, water-closets, I believe, are to be found?—Yes, they are to a great extent. I have not by me the per-centages, but I think I returned to the River Commissioners that I had counted up 46,000 water-closets in 82,000 houses; but I am not quite certain about it.

839. Do you know whether there is any case where a constant supply is given, in the ordinary sense of the words, where there are not cisterns in connection with the water-closets?—I do not know of any.

840. I suppose it would be hardly possible to have the use of a water-closet without some cistern or other?—I consider that a pipe might be made large enough

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enough to carry a sufficient flush into a closet, but such a condition of things as to have a cock in a water-closet, being as it were a secret delivery of water, it would not do; it would be running all night in every house without any control. I think it would be the maddest kind of arrangement possible.

841. The system that you suggested to the Committee yesterday as the best mode of securing that houses should be well fitted was, as I understood, that there should be a license granted to the owner, or a license required from him before any house was occupied?—I think that that would be a very effectual way of striking at the root of all the difficulties that now exist.

842. The company complain that they are powerless at present to enforce proper fittings in the houses?—Yes; and they are powerless to enforce the taking on a supply of water.

843. Can you cut off the supply if there is waste?—Yes, or if there is a misuse of the water.

844. You have no power of enforcing a sufficient sized receptacle being put up?—There is some receptacle, but it is not sufficient, and it requires very arbitrary action to carry that out to the full extent.

845. You suggest that no house should be occupied until such a license was granted; and that if there was not a sufficient receptacle provided for the water, there should be power given to withdraw the license?—That should be one of the items of approval; but there are many other grounds on which many houses in London should be declared uninhabitable, besides a deficiency in the supply of water.

846. My learned friend yesterday seemed to think, that there would be the same liability on the part of the owner to have the fittings stolen, when there was an intermittent service as when there was a constant service. With the intermittent service at the present time, are there any brass fittings at all in those houses?—Yes.

847. In many cases there are not?—No.

848. The water is turned on for a certain time from the main to the service pipe to fill the tub or the butt, or whatever the receptacle may be?—Quite so; but still we demand the fixing of a ball-cock in any case; there ought to be a ball-cock in every case; they are things which are being continually enforced.

849. Still there would be a much larger amount of fittings required if you had the system of constant service?—A much larger amount of fittings would be absolutely necessary in that case than are now necessary. If a neighbourhood or a district, or a block of houses, are so badly fitted and kept that they have no ball-cocks or cisterns, it would be madness for us, under present circumstances, to attempt to give them any kind of continuous supply while they are in that condition.

850. Wherever there are baths in a house, it would be, I presume, necessary to have cisterns?—Yes; it would be advisable in all cases.

851. Wherever you want a large quantity of water at once, it is very important, is it not, to have a cistern?—It is very important to have a cistern to fill up from.

852. Then there was a point referred to yesterday which my learned friend, on the part of the Board of Works, did not seem to appreciate, as to what you propose to do with the reservoirs under your Bill of the present Session; I believe that the uncovered reservoirs are on a different side of the River Lea from the covered ones?—Yes; the River Lea runs between them; the uncovered ones are on the eastern side of the River Lea, and the covered ones on the western side.

853. It is, I believe, the uncovered reservoirs that you propose to fill up?—Yes; with the exception of a small receptacle for the surplus water.

854. And on the west side you propose to fill up the whole of one of the covered reservoirs which is in gravel, retaining a part of the one which is in clay?—Yes; exactly so.

855. In order to prevent all chance of leakage or soakage into any part of the reservoir?—Exactly so.

Chairman.] Can any one of the learned Counsel give the Committee an explanation of what is meant by "constant supply in other towns," and how it is conducted, for, at the present time, I am afraid we really do not know what we are asking about.

Mr. *Clerk.*] "Constant supply," I understand, means only constant pressure.

Chairman.] I am now referring to the sentence used by Dr. Farr, which you will find at page 3; he says: "It would be a source of additional safety to London if the tanks and butts were all abolished, and the pipes were filled on the system of constant supply. The time has come for this reform." That suggests a system without tanks or butts, and no intervening storage between the company's supply and the consumers use of the water.

Mr. *Clerk.*] That appears to be what Dr. Farr had in his mind in making that report.

Chairman.] Can you give the Committee any information as to what constant supply means; otherwise we may have to recall these witnesses after we have got that information, because these are practical gentlemen.

Mr. *Wilkinson.*] The Metropolitan Board of Works propose to call Mr. Bateman, the originator, I believe, of the constant supply system, who will explain fully to the Committee the entire mode.

Chairman.] It is of no use examining the witnesses speculatively.

856. Mr. *Headlam* (to the *Witness*).] How far does the property of the company extend; do the mains belong to the company?—The property of the company ends with the iron; the service pipe belongs to the company.

857. And the the continuation pipe belongs to the landlord of the particular house?—Yes. This (*pointing to the service pipe*) belongs to the company, and this (*pointing to the communication pipe*) is the property of the owner of the house; it is laid down at his expense, and kept in repair.

858. Mr. *Kekewich.*] Is the communication pipe always made of lead?—No; iron is used sometimes, but it is not good; lead is the best.

859. Is not lead liable to burst in a time of frost?—Yes, but it is more durable than iron.

860. Do you lose much of the water by the bursting of the pipes?—Not anything large.

861. As far as I understand you, the principal waste is in consequence of the deficient construction of the water-closet apparatus?—Yes; and from the water being allowed to run down.

862. Two-thirds of the supply are consumed by the water-closet?—Yes; two-thirds of what goes to the domestic supply is so consumed; only one-third of it is consumed for cooking and drinking.

863. *Chairman* (to Mr. *Clerk*).] I think we will not pursue the question further as to the constant supply, until the meaning of those terms has been explained, and then you can examine this gentleman again upon the question when it comes before us. (To the *Witness.*) Will you be good enough to state where your first point of contact is with the New River Company's works or system of supply?—Or of distribution?

864. In any way; either in drawing or receiving the supply, or in distributing it?—We have no exact contact in the way of receiving a supply; but in point of distribution, the line as between the salmon colour and the grey on the map behind me is the division line between us.

865. Do the mains come together at any of those points?—Hardly; the service pipes do, not the mains.

866. Mr. *Cripps.*] You do not mean serving the same houses?—No; but we may in the same street.

867. *Chairman.*] As I understand you, the point of contact is by the service pipes, and not by the mains?—By the extreme ends and ramifications of the pipes.

868. How far off are your mains from their reservoirs?—We have a different focus entirely. The focus of one of the largest mains is at Old Ford; our second focus, which is not so large, is at Lea Bridge. The focus of the New River supply is either from the New River head, or the two reservoirs above at Stoke Newington.

869. How far is that from your reservoirs at Lea Bridge?—I think a mile and a half.

870. Your's are at Tottenham, are they not?—No, at Lea Bridge.

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871. That is the nearest point, is it not?—Yes.

872. Are not your reservoirs at Tottenham?—No, they are at Walthamstow; but they have no apparatus of supply.

873. How far is the reservoir at Tottenham from the New River?—Under a mile, as the crow flies; no, I think it is not within a mile.

874. What is the objection to your receiving all your water from the New River?—Because they have not got it.

875. Is there any objection to your receiving all that you require from the New River?—There is no mechanical or physical objection.

876. Nor engineering objection?—If the quantity of water which the East London Company now receive and distribute had to be taken out of the river, where it could be conveyed down the New River, there would be the whole question raised about the Government powder works and mills, and all the mill property between the present source of the New River and the present East London Company's Works.

877. You take the water from the River Lea, do you not?—Yes.

878. At a place considerably below the point where the New River Company takes it?—Yes; many miles.

879. Between those two points it appears, from the Report of the River Commissioners, that there is a great deal of deleterious matter put into the River Lea?—The proportion of population below the source of the New River is not very different from the proportion of populution per mile above the source of the New River.

880. Therefore, you would still have the additional increment of all the population intermediate?—The additional water and the additional population.

881. What is the additional water that comes into the Lea below the place where the New River Company takes its water?—So much as there is at that point.

882. But from what source does it come?—The two tributaries enter the River Lea below the point where the New River Company take their supply. The river has large springs in it, and it receives a large increase of volume in going down the valley.

883. Which are the tributaries which you have now referred to?—The Ash and the Stort on the eastern side, both of which fall into the general system, below the point where the New River Company take their supply from.

884. What is the volume of water that is delivered by those two tributaries?—It is a very considerable volume. I cannot give you the figures offhand, but they are sufficiently well known. I will obtain them for you.

885. Mr. *Henry Baillie.*] Is the Stort water a very impure water?—It is not a first rate water.

886. *Chairman.*] Is it more impure than the water of the Lea at the point where it joins?—Yes, it is rather more impure.

887. What is the character of the water from the Ash?—The Ash water is very pure.

888. It falls in, I think, very little below the place where the New River Company take their water?—I think it is a mile and a-half or two miles below.

889. The intermediate town is Ware, is it not?—Yes.

890. Does the town of Ware discharge a considerable amount of pollution into the River Lea?—I think a considerable quantity.

891. The whole of the drainage of Ware comes into the Lea?—Yes. There is no system of purification whatever; and what is brought down from the town comes in.

892. The drainage of Ware is not cut off from the Lea?—No, it is not.

893. Would there be any difficulty in doing it?—If any general system of drainage was adopted it would be easy, I think, to carry the drainage of Ware into it.

894. But apart from that, could not the drainage from the town of Ware be easily intercepted and prevented from going into the Lea?—I should think it might very easily, and of the town of Stort more easily. That sewage might be readily distributed on the land, and turned to beneficial purposes.

895. Did you give to the River Commissioners a statement of the quantity of water passing down the river at the point from which you draw your supply?—I think not; but we have stated that in the answers given to your Committee.

896. What objection is there if the water of the New River is purer than yours, and the New River is capable of supplying a much larger quantity than is wanted, to your drawing the water from the New River into your reservoirs?—Because that would lead to casting aside the whole of our existing works.

897. But you have none above your reservoirs, as I understand?—If the plan were to carry all the water down the course of the New River, we should have to a certain degree a higher level.

898. The water would be the water of the New River?—Yes.

899. That would rather facilitate, would it not, the discharge of the water into your reservoirs than otherwise?—It could flow from there to the existing reservoirs.

900. What objection is there to having the water from the New River, if it be better than the water in the River Lea, where you draw it from?—The difficulty is in getting it into the New River, and then bringing it along its course.

901. If we had been told that a very much larger supply can be obtained from the River Lea below Hertford, and that the New River will convey down twice as much as it does at present, what objection is there to your receiving that water?—I cannot admit that there is that capacity in the New River to take in or carry on that quantity. But this is a question that is not new, for even as far back as 1852 the same matter was mooted and fully considered, and I do not know but what, if there had been a large volume of water in the upper valleys of the Lea, it might not have resulted in something before; but the utter impossibility of collecting a large quantity of water in the upper parts of the Lea, and the impropriety of cutting off the whole of the lower valley of the Lea, was so evident, that we continued as we were.

902. Was the New River Company ready to give you the water, and did you decline it?—I say that they have not got it.

903. We have been told by a witness, Mr. Muir, who has been examined before the Committee, that they have got it?—I have lived on the banks of the river for some time, and I have studied it for many years, and I know that very large works would be wanted to supplement the flow of the New River to the reservoirs; indeed, I am sure that all the reservoirs you could make upon the Lea would not allow of the whole supply for the two companies coming down by that course.

904. Have you had your attention directed to the report issued by the Rivers Commissioners on the River Lea?—I have read it rather hurriedly, but I have gone through it.

905. Have you had to consider the expediency of having a storage of the water higher up the Lea, at the points indicated in that report?—Not in consequence of that report; but we have had the question of the storage of water under consideration from year to year, and we have been continually thinking where the best places would be for the construction of reservoirs. I mean reservoirs in places of security, where the least damage to property would be done, and the least interference take place, and all those matters.

906. What is the conclusion that you have arrived at upon that subject?—My conclusion was that the place where we have began to make a storage reservoir is the best place now.

907. That is at Walthamstowe?—Yes; but there are sites above Walthamstowe where reservoirs could be made. I do not think there is any one place where a vast reservoir could be made; that is, to carry out the whole operation on one site, and I think it would be best carried out by having a series of reservoirs.

908. Supposing the objections to the Lower River were to prevail, have you considered the expediency of having a storage of water higher up, so as to cut off, or to draw your water above, all the impurities flowing in from the suburban population on the river?—Quite so. As I have already stated, in 1853 we came to Parliament with a plan for taking the whole of the supply at Fielde's Weir, and it was nothing but the determined opposition of the Government which cast that plan on one side; that is, at the junction of the sixth tributary.

909. The New River Company can take water which would be enough for themselves, and they have done so at the place where their river joins the River Lea; have they not?—I do not think so, nor do I think the water is there; indeed, so far is the contrary view correct, that they have even got subordinate apparatus in the lower part of the Lea to supplement that upper supply.

910. Where?—At Tottenham, and the apparatus is used when occasion requires.

911. Do they take water from the Lea at Tottenham?—They have machinery there to take it.

912. Do they do so?—They have taken it. I do not know what the continual process is, or what the quantity taken is; but there it stands, and it is kept in order to do so when necessary.

913. What has the Government to do with the construction of works at Fielde's Weir; what is their objection?—Because there are the whole of the powder mills at Waltham Abbey which were worked by water, and are almost entirely worked by water now, as also the Small-Arms Ordnance Factory at Enfield, which is very much dependent upon water power.

914. Can you state how many horse-power the water-power there represents?—I do not recollect now what the horse-power is; but I am aware that the power was cut up into a great number of wheels, so that the different operations in the making of gunpowder might be carried on detached from one another.

915. Is the making of gunpowder still carried on there?—Yes; and the Government rely upon the manufacture of gunpowder at Waltham Abbey, as maintaining a high sample for powder, and as ruling the quality with the traders and manufacturers.

916. Are the Committee to understand that the Government objected to your drawing water at any place above Enfield?—The objection entertained is against our drawing water anywhere above the powder works; the head of them is at King's Weir.

917. With reference to that clause which enables the local authorities to require that the supply of water provided should be given at 3 *d.* a week; is that clause, in your opinion, applicable to the ordinary run of houses in London which are let out in lodgings?—No, it is for a low kind of house.

918. What annual rent would such a house represent to which, under your clause, you could supply water at 3 *d.* a week?—I am not familiar with the figures, because this business lies mostly in the hands of the inspector.

919. If you will look at your own table of rates (*handing the same to the Witness*), I think that you will be able to give us the information; that is the rate which, I think, you actually charge?—Yes; I think it applies to such houses as two-roomed houses, generally speaking; that is the kind of house with a wash-house attached; it is 3 *d.* a week; a five per cent. house, and 20 per cent. off for discount.

920. It would be 13 *s.* a year water rate, would it not?—Yes, that is the rate.

921. Then the rent would be about 15 *l.* a year?—Yes, as the full value of the house.

922. If the house was rated at 15 *l.* a year it would come, would it not, within the operation of that clause?—Yes.

923. Are there many houses in your district of that annual value?—Yes; a good many.

924. Are those the class of houses which suffer chiefly from short water supply, or are they the larger houses which are let out in a number of apartments?—The houses that suffer most from a short water supply are the houses which stand in courts with no back yards, and where the poor people fetch their supplies from one pipe in the front, and where they have no means of storing the water; those are the houses of the poor which suffer the most; they have no means of storage.

925. Are those houses let at such a rental that they would come within that clause?—They are let at a higher rent because there is a great demand for houses in such places; every room is inhabited; and frequently by a family.

926. Therefore that clause does not give the local authorities power to control the water supply in such houses?—It does not.

927. To ensure a water supply in the houses that are let to numerous tenants at a higher rental than 15 *l.* per annum, it would be necessary to make some alteration in that clause to extend its operation?—Yes; but I do not think that the machinery of that clause could be adapted, because we find now that houses which were formerly very respectably occupied are now so cut up into separate lodgings, and so stuffed with people, that they are no longer poor houses. But still the apparatus for supplying water is quite inefficient.

928. Then it is necessary to extend that clause to all houses so, as to embrace

a house, however large, that is let in numerous apartments?—I do not say that exactly; but I would say that it is necessary to extend some kind of legislation.

929. Will you look at that clause (*handing the Metropolis Local Management Amendment Act to the Witness*). If that was extended to all houses, would the clause be sufficient, or do you see any imperfection in the particulars of the clause?—You would give, I think, the public authorities command over all houses, over every house.

930. You could not draw a line, could you, by the rental, between a class of house that was let to numerous tenants, and a class that was not?—No, the limitation would disappear; the vital force of the clause would disappear.

931. You could not distinguish by any rental between houses let in apartments to numerous tenants, and houses that were occuped by a single family?—No, the test of rent would not apply.

932. Assuming that the clause was extended to all houses, do you think there is any imperfection in the clause that would make it unworkable by the local authorities?—It would come, I think, to this; that the local authorities should have the charge of seeing that every house was properly supplied with water; and that would be putting all houses under the same *regimé* as under the Lodging House Act of last year.

933. Which clause of that Act do you mean to refer to?—I cannot exactly refer you to the part of the Act.

934. Do you see anything there about supplying water?—I am not so familiar with the language of the Act as to be able to speak to it.

935. You were to give us a plan showing the works?—Yes; this is it (*producing the same*). These (*pointing to the plan*) are the Old Ford works, and those are the two covered reservoirs. This is the western reservoir (*pointing to the same*), and this is the eastern reservoir. They were formerly made on these dotted lines (*pointing to the same*), and when covered I had the upper part of the dividing bank taken off at a certain level, and the whole were arched over in one. We proposed to do away with this one (*pointing to the same*) entirely, and fill it up, and retain the use of that one (*pointing to the same*), with the bottom raised to a higher level.

936. So that the bottom will be higher than the bed of the river?—Yes.

937. Colonel *Hogg*.] Have you ever put any pipes in subways?—Not in any extensive way; we have a few passages which are called subways, underneath railways, for instance.

938. Do you find that that plan answers?—It must answer there, of course. We could not lay them in any other way.

939. Is it not a saving to the company not to have to break up the streets for the purpose of making repairs?—Yes; if a pipe was once placed in a subway, of course the expense of pulling up the streets is avoided.

940. Would there be any greater expense in putting a pipe into a subway than laying it down in a street?—In some cases it would cost a great deal more, and in other cases the inconvenience of taking large pipes into a subway is considerable.

941. Is it not attended with much less expense to put it in a subway than to have to break up the street?—It depends upon circumstances, but perhaps the balance would be in favour of the subway.

942. And especially as to the convenience to the public?—The interruption to the streets would, of course, be diminished.

943. Should you have any fear if gas pipes were put in a subway?—I should not like to be in the same way.

944. Not if it were properly ventilated?—I do not think it is possible to ventilate sufficiently to avoid all risk of accident.

945. Are you not aware that in Southwark-street gas pipes have been so laid down for some months fully charged?—I am told so; and when the Committee were sitting on that question before, I went through the subway in Southwark-street, in order to examine it with some men belonging to the Board who had charge of it, and I smelt a little smell at one place crossing a gaspipe.

946. I am talking of the present time?—This is the identical subway to which I am referring. There was a gaspipe that crossed, and I lifted up my candle to see what it was, and I said "What is this?" and the man immediately said "Do not do that, Sir."

947. Do not you think that extra power is required to oblige landlords of houses to furnish cisterns in the poorer districts?—Yes, I think that they ought to be put under stronger compulsion than they are now.

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948. Do you mean under the parochial authorities, or under the Metropolitan Board?—I think that the local authorities ought to have greater power to oblige landlords to put up cisterns. I think that they ought not only to have the power to do it, but that it ought to be made their duty to do it. They, possibly, have the power now, but the duty is not compulsory, and therefore it is not performed.

949. Mr. *Kekewich.*] Are slate cisterns used to a great extent?—Yes, to a very great extent, and they are very good; but the majority of cisterns now-a-days are deal cisterns, lined with zinc.

950. Do they chiefly come from Cornwall, or from Wales?—I do not know exactly, but I think they come from Wales.

951. Colonel *Hogg.*] Do not you know that the parochial authorities have often tried to compel the landlords to put cisterns into houses, and have failed?—I do not think that it has been done to the extent that it ought to have been done.

952. Lord *Frederick Cavendish.*] I understood you to say that the population and the drainage into the Lea below the source of the New River was about the same as the population above that source?—There is rather a larger population per mile.

953. And also that the quantity of additional water coming into the river was perhaps as great below that source as above?—Not quite; rather less, but an approximation to it; there is no great difference.

954. I see by the report of the River Commissioners that, whilst in the water of the Stort the organic contents were 1·37 grains per gallon, in the water of the Ash the grains were 2·10. Those are the two chief tributaries, as you have stated?—Yes; and I cannot account for so large a proportion as that in the water of the Ash, inasmuch as it is as rural a stream as any of the tributaries of the Lea.

955. And the result is that the solid residue in the Lea, at the point of diversion for your waterworks, is ·97, or double that of the New River; have you ever analysed this water?—Frequently.

956. Are you aware of these facts?—I should mention that it will depend upon the time the sample is taken. Those samples were, I believe, only taken once, and I think they say that the water was in flood at the time.

957. Do you consider that such an amount of residue shows the water to be not sufficiently pure?—I do not think that the sample of the water was at all a fit one, as the water was in flood at the time, upon the question of impurity.

958. It appears to be double that of the New River?—Yes.

959. *Chairman.*] Will you explain to the Committee how the construction of reservoirs, which would merely receive the flood water of the River Lea above Enfield, could interfere with the use of the river for the purposes of the Government?—It would not interfere at all, if the waters to be retained in them were merely flood waters which the Government might very well spare, and there is legislation already provided by which they could be compelled to spare that water.

960. If the object of those reservoirs is merely to impound the flood water of the river, the objection would not hold good that you have stated on the part of the Government?—Quite so; but impounding the flood water for the supply of London would take us into works that I do not think we could meet in any way.

961. The object of these reservoirs is to carry off a greater amount of water than the average flow, is it not, and not simply to take into the reservoirs the ordinary flow of the river?—If you can take into the reservoirs the water above the point of contamination, and if you can compensate all the millers who have had the use of the water below, you would get an improved supply.

962. You woud not, I suppose, construct a reservoir for the purpose of putting into it the ordinary flow of the river?—It would not in that way be an advantage unless it was made to contain storage.

963. The object of making a reservoir is to take out of the river, is it not, the extra quantity of water that is in it at any time, and that could not be objected to by those who use the ordinary power of the river?—Certainly not.

964. No one could object to that?—No.

965. Whenever the river rises to a certain point, they take up the flash board, and let the water through, do they not?—Yes.

966. What you impound is all the water that would go to waste?—Yes; and

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which may now be considered to be detrimental, for as long as the river is in a state of flood, the mills are stopped, if it is a heavy flood.

967. Then it would be a benefit to people using the water for mill-power if you took off all the flood water?—Quite so.

968. And it is the object of a reservoir, is it not, to take off that water, on the assumption that if there is a flood at one time of the year, there will be dry weather at another?—Certainly.

969. And so you get at the average supply throughout the year?—Certainly, and that is the object of a reservoir for impounding the water.

970. To prevent your using for consumption in very dry weather water in which the proportion of flowing water is very much smaller than the foul water, and therefore the whole is very much worse?—It is so, but you are dependent, under that system, upon the occurrence of floods every year, which I think is hardly a safe view to take.

971. Not necessarily, because supposing floods were to occur in one year, and your reservoirs were filled, that storage would remain until the occasion came for using it?—Then your store of water must be very greatly in excess of your consumption.

972. Is that necessary; is not the stored water used to some extent in aid of a certain amount of supply; that is to say, have you not always your 30,000,000 of gallons, and the use of the storage is to give you three, or four, or five million gallons a day in aid?—Supposing you draw upon that storage in aid in one season, and you have a drought in the following one, and you do not replenish your reservoir, where would you be in the next season?

973. That is assuming, I think, what has not happened?—We have had such a year as that in 1864, when reservoirs beyond a certain size would not have been capable of being filled, and we have had dry winters, with scarcely any flood; that is to say, the frost and the snow have melted away without any flood.

974. If, in 1864, you had had the storage suggested in the report on the River Lea, you would not have suffered from any drought, would you?—As a matter of engineering, I should be sorry to put myself in dependence upon storage waters as long as there were running rivers near at hand.

975. That is not quite the question, but whether you should not have them in addition to everything else upon which you now depend?—If they were in addition, then they would be a beneficial addition to the establishment and to the means of supply.

976. If any effort is to be made to utilise the redundant waters of the Lea, is it, in your opinion, desirable that the two companies should be engaged in conflicting efforts, or that they should unite in one effort?—I think it is very immaterial whether they join or whether they do it separately.

977. Colonel *Hogg.*] You have given it as your opinion that by means of storage reservoirs you may secure in dry seasons 10,000,000 gallons a day for 50 days?—Yes, I have, and 500,000,000 gallons in all.

978. Mr. *Kekewich.*] Do you think it would be possible to obtain a greater supply of water from Artesian wells. I see that one of the companies gets its water entirely from those wells?—Yes. They are very fortunate in being situated in a district that is very prolific of water, and they get as much as they require by increasing the number of the wells, the Kent Waterworks Company. We have endeavoured to find water by boring into the chalk within our district, but the chalk appears to be of a different nature, and it is not so prolific of water as in the Kent district. If there were any signs of any abundance of water in our district, we should immediately take more measures to get it

979. I believe the River Lea flows entirely through chalk?—The upper tributaries of the Lea are entirely on the chalk.

980. Mr. *Ashley.*] In your cross-examination, in saying that you were in a company which was in the habit of taking water from Tottenham, are you aware that for the last two years they have not taken any water there at all, and that before that time it was quite occasionally that they did so?—I do not know the precise dates; I do not know exactly the last date when they did so.

[The Witness withdrew.

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Mr. *Denison* stated that he proposed now to call Mr. Sim son, as representing the Thames Companies.

After some discussion,

The *Committee* assented to this course being taken.

Mr. *James Simpson*, called in; and Examined by Mr. *Denison*.

Mr. *J. Simpson*.

981. You are a Water Engineer of great experience, are you not?—Yes.

982. And your father was before you?—He was.

983. Have you been engaged in one way or another with reference to most of the great water schemes which have been promoted in Parliament for many years past?—I have.

984. And particularly, do you remember the various inquiries which have been made from time to time about the Metropolis water supply?—Yes.

985. And the Bill of 1851, and the inquiries of 1851 and 1852, as I take for granted?—I was engaged in them.

Mr. *Denison* stated that he presumed that, on these matters, the statement of Mr. Hope Scott would be taken as sufficient.

The *Chairman* stated that all the official documents to which Mr. Hope Scott referred would be accepted, and requested that a list of those documents, with an official reference, might be furnished to the Committee.

986. Mr. *Denison* (to the *Witness*).] Were you examined before those Committees?—I was.

987. In 1851 Sir James Graham's Committee in fact approved of the New River, the Lea, and the Thames as proper sources of supply, did they not?—They did.

988. And we know that Lambeth had already gone to the upper part of the Thames in 1848?—Yes; Lambeth had moved in 1848.

989. Now, about what we may call engineering; we will begin with the Thames; will you tell the Committee what may be taken as the general flow of the Thames; how many million gallons a day is it?—It is generally about 600,000,000 or 700,000,000 gallons, but occasionally during floods it is very much more.

990. *Chairman*.] Is this at Hampton?—This is at Hampton.

991. Mr. *Denison*.] That average, I believe, would be a good deal higher than the 600,000,000 or 700,000,000 gallons?—It would; I have paid considerable attention to it.

992. Have they given the average flow of the Thames?—They have not; in fact, we have no very good account of the average flow, but we may judge that it is very enormous; it probably at times may be from 50 to 60 times the ordidary flow; my observations have been made on the summer level of the water, and we have had floods 11 feet 10 inches above the summer level, which flood a very large tract of country, and which increase the volume of the river very much indeed. Again, in dry seasons we have had them very much lower, two or three inches below the summer level; and at that time the quantity, exclusive of what the companies take, has been about 380,000,000 gallons; that is the lowest, I believe, that has ever occurred on the Thames; I took some pains in watching the river at the time, and the guages were very completely taken.

993. And that 380,000,000 gallons is after the companies have taken their 50,000,000 gallons, is it?—Yes.

994. So that there is 430,000,000 gallons as the minimum flow of the Thames?—There is.

995. Mr. *Headlam*.] It has never been more than one-seventh, has it?—No.

996. Mr. *Denison*.] Then in your opinion, is there quite sufficient water in the Thames for all the present purposes of the companies?—Decidedly so.

997. With regard to any further supply, what do you say; for how many years do you think that there is sufficient?—For 40 or 50 years; it is one of the largest streams in this country, and a stream which is very valuable, inasmuch as the volume of it is large, and is not likely to be affected by any but the heaviest showers.

998. What rate of increase of population are you assuming when you say

that you think there will be enough for 40 or 50 years to come?—I assume rather less than 2 per cent.

999. I think that works out to a doubling of the population in those 40 years?—Yes, in about 40 years.

1000. *Chairman.*] That is a very considerable assumption?—It is almost inconceivable. I have paid considerable attention to that, and although we have had a vast increase in the metropolis, there have been a great number of houses pulled down; it has been rather an extension of the houses than an increase. It is almost impossible to assume an increase at the rate at which we have been going on.

1001. Mr. *Denison.*] That would bring us at the present state to about 6,000,000, would it not?—It would.

1002. Now, as to quality; what is your opinion of the quality of the Thames water?—It is very fine water.

1003. We know its exact degree of hardness?—Yes, I believe it to be as good water as you can get in this district.

1004. Mr. *Henry Baillie.*] It is 16 degrees of hardness, is it not?—That is the highest. There are some seasons when the Thames is only 12 degrees of hardness, and when it it is boiled it comes down to about four degrees.

1005. Mr. *Denison.*] The majority of the water which is used for drinking is boiled, of course, except what is drunk in glasses such as I have before me?—Yes.

1006. There is a prejudice (I must call it that name) in favour of very soft water, on the part of some people; what have you to say upon that subject?—I think it is as you call it a prejudice. Hard water is better for keeping, and in many cases I should say, as far as my own observation goes, it is better for drinking; and I think that the great object in supplying a large town should be, to get water which is generally good water for the purpose, and I confess that I do not approve of the softest waters; they are very liable to act on leaden pipes, and a great deal of mischief like that may ensue. I was called in in the case of Claremont, where the French family were poisoned, and it was said to be a very fine water; it was soft water, but it was very injurious there. Again, I was called in at the dog-kennel at Windsor, and there all the dogs were affected by it, and I believe that the keeper was affected; but certainly the dogs were liable to paralysis of the feet. We had this peculiarity in the experiments and the chemical analyses which were then made, that by passing the water through sand filters, even with a small quantity of lime in it, the lead was all right again, and the water was very good and wholesome; and I may mention, that it is a curious effect that every time that they filtered that water it seemed to get a degree harder.

1007. There are two ways in which water is made hard, are there not; one by having carbonate of lime in it, and the other by having sulphate of lime?—Yes.

1008. And the carbonate of lime boils out, does it not?—It does.

1009. The sulphate of lime does not?—No. The Thames water contains a very small quantity of sulphate of lime, and it is so far beneficial, that that is the protection against lead pipes. Now I know this, independently of acting for the company; some years ago I had to do with the supply of gentlemen's estates and mansions, and that led me to go into a very particular analysis of the water; Professor Brande was then in the habit of analysing for me, and his report always was, that if the water contained even a trace of sulphate of lime, it was a sufficient protection against the effect of lead pipes.

1010. The Thames water, I understand you to say, does contain a little sulphate of lime?—A very small quantity.

1011. But the majority of the stuff which makes it hard is carbonate of lime, which boils out?—Yes.

1012. That is the white stuff in kettles?—Yes; a large quantity of water coming from the springs in the chalk, and from the oolite, both of which contain a quantity of carbonate of lime.

1013. Another thing, which is stated as an advantage of soft water is, that it makes very much better tea; have you ascertained that at all?—I think that really was a fallacy of the Board of Health, because, everybody knows that when you boil water it begins to deposit at about 180 degrees, and it gets down; and, practically, although you may call it hard water, when it is in the teapot it is soft

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soft water, and very seldom have I seen that water analysed to less than five degrees of hardness, and very often only three, which is practically as soft water as you can get.

1014. Another of the fallacies of the Board of Health was, that we were to be saved (I think they went so far as) a million a-year in soap?—Yes; but I think those were mere assertions. There was no ground for it. No doubt there is some economy in the use of soft water, but if you apply it to the whole quantity used, that is a mistake. We do not want soft water for washing yards, and a variety of purposes of that kind.

1015. And the majority of the washing is done with hot water, of course?—It is.

1016. So that that water has become soft?—It has.

1017. Do you know anything of the experience at Paris in reference to this question?—I know that they have decided there that water which is moderately hard is much better for the supply of the City than soft water; and, in fact, they have gone to a district there which is a limestone district.

1018. For the very purpose of getting hard water?—They have.

1019. Do you know how far that water which they have there differs from ours in the Thames?—I believe that it is very nearly like it, but not quite so hard.

1020. Mr. *Henry Baillie.*] Do you know what is the quality of the water in the great artesian well of the plain of Grenelle; is that a soft or hard water?—That is the soft water from the ingredients which it contains. All those waters contain a large portion of carbonate of soda; but there is a popular delusion about those deep spring waters being so pure. They are really not so. Chemical analysis proves that they are anything but pure, and the softening properties which they contain are due principally to the carbonate of soda, but they really are impure waters.

1021. *Chairman.*] Do you mean that they have mineral elements in them, which they obtain from percolating through different soils?—No doubt.

1022. Mr. *Headlam.*] Perfectly pure water would be soft, I suppose, would it not?—Yes, rain water. When you say perfectly pure, I believe that in many cases we have to distrust even rain water, especially as it comes off houses. It is not pure. It contains a good deal of nitre. When I was surveying officer at Leicester, examination proved that renal diseases were very common in consequence of it.

1023. *Chairman.*] Was that where the water was drawn from the tops of houses?—I saw that they had means of turning taps, so that they let the first washings go away; but still it was not pure water.

1024. Mr. *Headlam.*] What is the cause of the action of soft water upon lead?—It is a chemical action, from exposing fresh surfaces, and is not controlled by any chemical means. They have a means of manufacturing white lead, which was stated to be the carbonate of lead, the white lead of commerce; but it is not so; it is the acetate of lead they make, and that is done by turning over fresh surfaces of lead exposed to water, and washing off the surfaces from time to time.

1025. Then a small portion of sulphate of lime prevents the action of pure water upon lead?—It does.

1026. That water which was recommended by the Board of Health, I think, was recommended from Bagshot Sands, was it not?—It was.

1027. Were there any mineral contents in that water, or had it been purified by passing through the sand merely?—Some of the springs contained it, but generally speaking it was due to the very deep filtration of the Bagshot Sands; but there, I think, independently of the quality, the water would have totally failed.

1028. But would that water from the Bagshot Sands have acted upon lead?—Yes.

1029. But there was very little mixture of mineral matter in that water?—Not much. Some of the springs were bad. Now the springs about Farnborough are very pure, in fact, they are all of the green sand.

1030. That is very good water, is it not?—It is beautiful water.

1031. *Chairman.*] Do you know that the theory of arterial water was tried at Rugby under the direction of the Board of Health?—Yes.

1032. And it did not produce a sufficient supply, did it?—It was a long while before they got any water at all, and when they got it it was salt water.

1033. They bored to the salt, and then they got salt water, did they not?—Yes.

1034. And now they go to the river and draw from the river as they do at other places?—They do. I have been consulted about that. There is great difficulty in that district in obtaining water. In some cases in the Oxford clay you get sulphuric acid, and it is not at all an easy problem to solve.

1035. Mr. *Denison.*] I think that I may now go to another point. Now about the works on the upper navigation. In 1865 we know that they were in a very bad state, and that lead to a Bill. You were examined before that Committee, were you not?—I was.

1036. And, therefore, so far as that went, you helped to pass "The Thames Navigation Act of 1866?"—Yes, I was interested, and I reported to the Government upon that, as far as I was connected with the supply of Windsor Castle. The Government have a very fine water-wheel there, and I was under an apprehension at one time that the whole would be swept away, the works were in such a state.

1037. You gave evidence also before the Commission which sat on the same subject, did you not?—I did.

1038. It has been stated to the Committee that the five Water Companies which take from the Thames, offered in the Committee to pay an annuity of 1,000 *l.* a year, besides what they did before?—Each company did so.

1039. Towards the operations of that Bill, viz., getting the Thames purified? —They did.

1040. How far up will that carry the purification of the Thames?—It carries it up to Lechlade, I think something like 150 miles, or nearly so, by the course of the stream.

1040*. Now, then, assuming that that Act is acted upon by the Conservators, I suppose the Thames will be very considerably better than it is at present?—Yes, decidedly so. It is coupled with this fact, that they prevent the sewage being thrown into the river. I know that many persons have an idea, in consequence of the large population, as they state, up there, that the river is now fouled to a great extent; but that is not so. It is a very small population, comparatively, as you may see in travelling over the country, and the Thames water above Oxford is very pure indeed.

1041. Of course, we did not agree last year to pay that 5,000 *l.* a year, as I may take it, jointly except for a consideration, and the consideration was the clauses, which I suppose the Committee know of, for preventing the pouring of any dirt into the river?—Yes, it has been proposed to drain Oxford and Reading, and some of the larger towns which are not drained now, and that Bill would stop it.

1042. I do not know whether that will affect the hardness of the water at all? —I do not think it will.

1043. But in other respects will it remove from the water almost everything of an organic nature, which is the chief objection?—Yes, or it will prevent the increase of it, which is a very important thing.

1044. I think that it will do more, because the towns at present draining into it are to be stopped, are they not?—Yes.

1045. And besides the towns, there are manufactories of various kinds, which now send dirt into the river and all that is to be stopped, is it not?—Yes; there are many paper mills which will be stopped; in fact there is no reason why they they should send it in; they could arrest it all.

1046. Mr. *Henry Baillie.*] Does the Bill apply to the Colne?—Within three miles of the main stream.

1047. Mr. *Denison.*] With regard to the pollution of the water, these are the clauses: "From and after the passing of this Act, it shall not be lawful for any person to do any of the following things, namely: (1.) To open into the Thames any sewer, drain, pipe, or channel, with intent, or in order thereby to provide for the flow or passage of sewage or of any other offensive or injurious matter. (2.) To cause, or without lawful excuse (the proof whereof shall lie on the person accused), to suffer, any sewage or any matter aforesaid, to flow or pass into the Thames down or through any sewer, drain, pipe, or channel, not at the passing of this Act used for that purpose. (3.) To open into any river, stream, cut, dock, canal, or watercourse communicating with the Thames, at any point within three miles of the Thames, measured in a direct line therefrom, any sewer, drain, pipe, or channel, with intent or in order thereby to provide for the flow or passage of sewage, or of any matter aforesaid, in such manner that the same will be carried, or be likely to be carried, by, through, or out of that river, stream, cut, dock, canal, or watercourse, into the Thames. (4.) To cause, or without lawful excuse (the proof whereof shall lie on the person accused), to suffer any sewage or any matter aforesaid, to flow or pass into any such river, stream, cut, dock, canal, or watercourse, at any point within the distance aforesaid, down or through any sewer, drain, pipe, or channel, not at the passing of this Act used for that purpose, in such manner that the same will be carried, or be likely to be carried, by, through, or out of that river, stream, cut, dock, canal, or watercourse, into the Thames." Then there is a power of summary conviction, and then comes the discontinuance of the present sewage. Clause 64 is this: "Whenever any sewage or any other offensive or injurious matter is caused or suffered to flow, or pass into the Thames, or is caused or suffered to flow or pass into any river, stream, cut, dock, canal, or watercourse, communicating with the Thames, at any point within three miles of the Thames, measured in a direct line therefrom, in such manner that the same is carried, or is likely to be carried, into the Thames; then and in every such case, whether any such sewage or other matter aforesaid, had or had not been so caused or suffered to flow or pass before the passing of this Act, the Conservators within a reasonable time after knowledge of the fact shall, and they are hereby required to give notice in writing, under their common seal, to the person or body causing or suffering the same so to flow or pass, to the effect that they require him or them to discontinue the flow or passage thereof as aforesaid, within a time to be specified in the notice, not being in any case less than 12 months, or more than three years; provided that the Conservators may, if they think fit at any time, and from time to time, extend the time specified in the notice by another notice in writing under their common seal; but nothing in this section shall authorise the Conservators, until the expiration of six months after the passing of this Act, to give to the owner or occupier of any mill or work, a notice requiring him to discontinue the flow or passage as aforesaid, of any liquid matter produced or used in the manufacture of paper, or in any process incidental thereto." That is the important clause with regard to the present sewage; and the one which I read before, with regard to future sewage, there was the scavenging of the surface besides, but that was not so important probably as the sewage; I do not know whether you have the means of giving the Committee, or whether we must get from others, any information about the purity of the water of the Thames high up, whether it is not contaminated by sewage?—I have no means beyond my observation, in going there from time to time; it is very beautiful water.

1048. But there is no doubt, I suppose, that it will be a very pure water indeed?—I believe so.

1049. Are the Commissioners, before whom you gave evidence, considering the question of whether they shall extend this jurisdiction higher up than the three miles along the tributaries?—I understand they are.

1050. Therefore it will be that much better, because the rival schemes, as we may call Mr. Bateman's, and so on, we are not to go into, but you have read those pamphlets of course?—I have.

1051. Do you think those are, any of them, practicable schemes?

The *Chairman* intimated that it would be better to wait until those schemes were before the Committee before witnesses were examined upon them.

Mr. *Henry Baillie* inquired whether the Commissioners had power to extend their jurisdiction beyond the three miles.

Mr. *Denison* replied that the Commissioners had no power, without an Act of Parliament, to extend the operation of the Act of 1866, but that they had power to continue their inquiry.

1052. Mr. *Denison.* (to the *Witness*).] I think we have not got yet the amount of gathering area which the Thames gathers from; what is it?—Measured on the Ordnance Map I make it 2,500,000 acres; it is a very large gathering ground.

1053. *Chairman.*] Above Hampton it would seem to be 2,352,640 acres?—Two million five hundred thousand above Kingston, and above Hampton 2,352,640 acres.

1054. Mr. *Denison.*] Your figures apply to the whole, I think?—No, to Kingston.

1055. Now a word about constant supply; that was a question which was considered a good deal in the Committee of 1852, was it not?—It was.

1056. And the Committee know what was done upon that; are the clauses, with regard to constant supply, in the Act of 1852 very much the same as are found in a good many special Acts?—Yes.

1057. We know that there are two modes of constant supply, one without cisterns and the other with cisterns?—Yes; I think you may say, though, that generally speaking the modern practice is to apply cisterns for the water-closets. They have found great objection without.

1058. The modern plan is to have cisterns for water-closets?—Yes.

1059. *Chairman.*] Will you explain what you mean by constant supply without cisterns?—It is by means of pipes connected direct with the mains, or the pipes belonging to the companies being constantly charged with water.

1060. Do you mean drawing direct from the company's pipe through the communication pipe to the house?—Yes.

1061. Then will you explain what is done in the house after the pipe enters the house, in the system of constant supply without a cistern?—It is merely taken to a sink and a cock put at the end of it.

1062. There is nothing more than the pipe continued over a sink, with an ordinary cock at the end turned by hand?—Yes.

1063. Then is there a waste pipe immediately under the cock from the sink?—In some cases there is, but in the majority of instances there is not. In fact there is such difficulty in preventing people from wasting water, that wherever we can possibly prevent it we do not allow a waste pipe.

1064. The check is that the house would be flooded if they allowed the water to flow; how is that; that is the point which we want to ascertain?—In some cases the waste pipe is allowed if the parties find it inconvenient without it. Take the case of Cambridge, which is a new works which I constructed; many parties there have so objected to have the water without the waste pipe that the companies have adopted the bringing of a waste pipe to a point where it can be seen, so as to ascertain whether they waste the water either in the street or in the yard, or in the kitchen.

1065. Where it flows out in some way so that the flow of the water through the waste pipe can be seen?—Yes.

1066. Mr. *Denison.*] That may be done in the country, but it would be very difficult in London, would it not?—The application to London is a difficult problem, and it will be an expensive problem. Taking the average of houses, the alteration of leaden pipes will be a very expensive thing. In some cases it may be done, probably, for 5 *l.*, in others it would amount to 10 *l.*, and in the better class of houses it will cost 15 *l.*

1067. By whom will that expense be incurred?—The pipes are laid through the walls of houses, and they are plastered up in many instances, and the pipes are not half the weight they would require to be to sustain constant pressure, because it is not only constant supply, but high pressure. We are bound under the Act to supply water from the tops of the houses, and there is no town which I am acquainted with where the compulsion of water supply is so great as in London. There may be instances in other towns, but it is almost universal in London; in point of fact, the late Mr. Thomas Cubitt consulted me on that point, and he said: "That is one of the things that I shall let the houses for. If you will devise me the best means of supply, I shall make a merit of it, and let them;" and no doubt he succeeded, to a very great extent, by showing parties who wished to take houses, that he had a convenient source of supply. He not only supplied water to every floor, but he supplied hot water as well as cold, and many more water-closets. Gentlemen with residences in Belgravia would not be satisfied with common supply. It is a different thing altogether. Then, again, the baths are much more convenient than they ever were before. There is one source of supply which requires to be very constant, and I do not believe that it can be done without cisterns, and that is the hot water at the back of the grates. That is indispensable in a large house, and that is felt so material, that

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that the plumbers, unless they are looked after, habitually set the cock in the small cistern, supplying it to run to waste at the rate of about 10 gallons an hour, that is 240 gallons a day. The application of the system to London I do not say is impossible, but I know it would be very expensive. I do not see my way clear to it, and it will lead to what would be thought very objectionable in London, and that is the continued espionage upon the houses which would be necessary. For instance, now they do not like our man to go into the houses, and rather than allow it in particular houses, I have been in the habit of going myself if I heard of any case requiring it, and asking permission; in fact going to the gentleman or lady of the house; but it is not quite the thing to have common men going into houses. The householders of London are liable to many unpleasant things; robberies take place. The personation of parties is very easy in London.

1068. *Chairman.*] You mean by some person personating the inspector of the Company?—Yes, it would be very objectionable. I am continually telling parties about it, and unless it was looked to about once a month, in many cases it would not do.

1069. We have only had Cambridge mentioned as a matter of fact, but if you are acquainted with the actual modes in force in other towns, it would be convenient now to describe them, if you personally know the systems in use, as to whether there is a constant supply without the intervention of a cistern?—I know many towns and I know that they are under considerable difficulty, and that great waste of water occurs in consequence.

1070. Will you describe to us exactly, taking three or four towns for example, what is the arrangement in the houses in those towns where there is no cistern?—The principle of the houses is to have no waste pipes at all.

1071. There is a communication pipe with a cock, and nothing under it to catch the water if it flows to waste?—No, except that cock itself was left open, which is very often done.

1072. That water has to flow where, then?—Into the drain.

1073. Is the pipe and cock laid into the house, or is it in the yard?—Sometimes in the yard, but more frequently in the kitchen or scullery.

1074. Is it a general rule, as far as you know, that at places where there is constant supply there is no waste pipe immediately under the discharge pipe or delivery cock?—I should say in more than half the instances there is not.

1075. Mr. *Denison.*] I suppose in a scullery there must be a waste pipe, because they wash the dishes and have to pour the water away somewhere?—A waste pipe we call a pipe receiving the waste water from a cistern; you speak of a sink pipe.

1076. *Chairman.*] Is there immediately under the cock that delivers the water into the house, a pipe that will allow any waste of that water to run off; is that insisted upon, or not?—In some cases it is, and in some it is not. In Bristol, that is a point of contention between the inspectors and the inhabitants, they furnish the pipes away from the sinks, and they draw the water and take it to the sinks, but they find a few months after that they get the plumbers and connect it.

1077. Mr. *Denison.*] The Water Companies have no means, have they, of preventing people from putting in, under one name or another, a drain, or waste pipe, or something, which does protect their houses from being flooded?—No.

1078. *Chairman.*] But do the companies in those cases make it a condition that there shall be no such apparatus, so that the house shall be flooded if the water is allowed to run to waste?—Yes, but they are not allowed to carry it out, because the floodings are very frequent. It is a very serious thing to have a house flooded; you have all the carpets spoilt, and furniture spoilt, and it is a thing I would not allow in my own house.

1079. Mr. *Denison.*] Although you are a water engineer?—Persons talk about constant pressure, but they do not know what the effect of it is.

1080. Colonel *Hogg.*] There is no difficulty, I hear, in other towns, such as Glasgow, Penrith, Liverpool, Manchester, Bradford, and Coventry. They have a constant supply in every one of those large towns, unless I am misinformed?—I believe you are quite correctly informed; but I happen to know that in some of those towns there is a difficulty, and one of the difficulties is the large quantity of water they use; for instance, Glasgow itself is an instance where the quantity of water used is enormous. It has been as much as 65 gallons per head per day.

1081. I have been informed that the inhabitants of those town would not think of going back to an intermittent system?—I dare say not. It is unlimited in the case of Glasgow, I think, by the water itself; in fact, it necessarily must be so. We have the experience of the American towns; I endeavoured to get the report before this Committee sat, but I have only been successful in the case of Boston. They have absolutely used the river there, and it was supposed to be four times the quantity that the town would ever want, and that has occurred in the face of a very serious inspection. In one year they fined upwards of 3,000 persons for wasting the water.

1082. Mr. *Denison.*] My learned friend has handed the paper to me. I see that they have been obliged to call in the aid of the police to prevent the evil of the wasteful use of water in the city, that is one of those passages?—Yes. Those are extracts from reports of some years, and the reports from New York are even stronger than that, and it had this bad effect: that in consequence of the waste of water in the lower part of the city, the higher part was unsupplied.

1083. I will read this passage from the report of 1864, about Boston: "This was immediately carried out" (whatever it was), "and the result has proved that nearly half the water that has been brought into the city has been wasted. For the first 10 days, which included about one-third of the city, there were reported 531 cases where water was running to waste, and 1,353 cases where fixtures were out of order, and water was leaking on that account;" and there is a great deal more of that kind. "This shows a consumption of 97 gallons per head" (that is, at Boston in America); "an amount believed to be without parallel in the civilized world." They might, perhaps, have added the uncivilized world too. It is nearly four times the quantity of water which is now got in London, is it not?—Yes; but we need not go to America for it. Take the case of Croydon, which is 12 miles from this room; that is an absolute failure as regards constant supply, and a very serious expense. They have not power to control it, and the inhabitants are in the habit of taking gutta-percha pipes; and I have seen the lawns three inches deep in water, when the inhabitants in places a little above the common level could not get water at all.

1084. *Chairman.*] Do you know what the exact arrangements are in that case?—The water is carried in without cisterns, and in some cases over sinks, and in some cases not; and they have rather a vigilant inspection there; but at this present moment the town is very badly supplied, and I had an application this morning from one of the railway stations, to one of the London companies, to extend their pipes.

1085. It is a simple delivery pipe into a house with a cock?—Yes.

1086. And with a sink under it, or not under it?—In the majority of cases not; but it is rather curious that they lately have been advocating cisterns there, as they found it very inconvenient in draining off the water, which they had been obliged to do; and the houses had been left without water. They are now rather recommending and calling upon the inhabitants to put in cisterns, they having previously only had cisterns for water-closets.

1087. Where do they get their water from?—From wells sunk in the chalk. It is in connection with the River Bourne, an underground stream which flows to the surface about once in seven years.

1088. Mr. *Denison.*] You were going to say something about Bristol; I do not know what it was?—It was merely in relation to the mode of supply to the houses. We find there that the inhabitants are in the habit of extending the pipes to the sinks, where they have been left away from them, and they are not at all particular in using the water. In the district of Clifton, the better part of Bristol, the quantity of water running at night, measured from a reservoir, was found to exceed the daily supply. Our resident engineer there paid particular attention to it, and he discovered that many of the inhabitants hooked up the water-closets, and the water ran constantly, so that it increased the supply very much; and so much so, that at certain seasons we have not had water enough for the supply there. We have now been taking water in from another district, and by more vigilant inspection, and the prevention of waste, to the detriment of a large number of the inhabitants, we shall accomplish it, I dare say, but it is a difficult problem.

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1089. Do you happen to know particulars of other places where they have constant supply without cisterns?—Yes, I know Carlisle; that is a particular instance. I constructed the works there, and we actually started those works and supplied water for all purposes to the extent only of 12 gallons per head; and it went on for some time, but the inhabitants got into the habit of using the water, it being more easy of access than it had been, and they had an impression in the town, which I believe was very true, that the water from the old red sand stone was very bad water, whereas the water from the Eden was very fine water, and the last time I measured it there, it was 28 gallons per head, and the waste has got so much beyond the power of the works, that they are now bringing a duplicate engine to bear, and are going to lay another main.

1090. It follows, necessarily from your figures, does it not, that if anything was to take place like that in London, the Thames would be really insufficient for the supply?—No doubt of it.

1091. *Chairman.*] What is done in those towns as to the water-closets?—Experience has proved that the only proper way of supplying water-closets is by means of cisterns.

1092. As a matter of fact, in all the towns which have been spoken of, do you know whether they have cisterns in the water-closets?—About one-half of them have cisterns, but the extent to which they have water-closets in country towns is nothing like what it is in London; a large number have nothing but the common privies.

1093. Mr. *Denison.*] Can you account at all for their doing what you said they did sometimes, viz., tying up the ball-cocks?—They have a notion that they can wash out the drains, but they do very little by that means, because it is a mere little drain of water going along at the bottom of the sink, and it does not flush them out; it is quite a mistake.

1094. They think that it does?—They think that it does; there have been such outcries of cholera in the district that the inhabitants seem desirous of doing anything; the local authorities have come to us and begged us to let the water be on, and turn it on on Sundays, or Saturday night, and anything we could possibly do to satisfy them we have done.

1095. One of the difficulties, or one of the things which makes stronger pipes necessary for constant supply, is the concussion which is caused by shutting every tap when there is a light pressure on?—Yes; when you turn a tap suddenly you hear a sort of blow, do you not?—Yes

1096. What is that blow?—Regurgitation of the water; it is on the principle of the Montgolfier ram that is heard; but to some extent we have counteracted the effects of that in constant supply by putting a small ferrule on, and the result of that has been to attenuate the water, and by the use of screw taps there is a sufficient interval to destroy the regurgitation.

1097. Then you are obliged to reduce it to what we may call a dribble?—Comparatively.

1098. And that would be inconvenient?—In many cases it would be so; for instance, in many cases the 50 per cent .of the water is used from six in the morning till 12 in the day.

1099. Is that the only way which has been found yet of guarding against the flow upon the pipes, and the risk of bursting?—Yes; we know the pipes which we have been in the habit of using in London have been only half as strong as is necessary.

1100. When we have statements made that there is a constant supply in certain towns, we cannot assume from that that it is a constant supply without cisterns, can we?—Not entirely.

1101. Every case must be investigated by itself, must it not?—It must; I rather think that the companies are in possession of evidence of it; they have employed independent engineers to investigate that in a great many towns.

1102. But it may be quite true that there is a constant supply at such and such a place, but unless we know about the cistern, we know nothing about it?—Just so.

1103. And also that whether that ferrule contrivance is used?—No.

1104. There are two companies, I think, with which you are specially connected, viz., Chelsea and Lambeth?—Yes.

1105–6. The incorporation of the Chelsea Waterworks Company was in 1843, and they have had further powers since, have they not?—Yes.

1107. They used to draw their supply at Chelsea Reach, I believe?——

The *Chairman* stated that it was not necessary to go further back than the year 1852.

1108. Mr. *Denison* (to the *Witness*).] Under the Act of 1852 the Chelsea Company established some engine-houses and filter-beds at a place called Seething Wells, above Kingston, did they not?—They did.

1109. And they had some reservoirs at Putney Heath?—Yes,

1110. And they are bound by the 20,000,000 gallons arrangement like the rest?—Yes.

1111. Their rental is 300 *l.* a year, is it not?—Yes.

1112. How much do they draw now in 1867?—Eight million gallons.

1113. Therefore they do not draw half of what they are entitled to draw?—Just so.

1114. Has any demand for constant supply, to your knowledge, ever been made upon them?—No.

1115-6. Do you know how much the Chelsea Company have spent in consequence of the Act of 1852?—They have spent upwards of 400,000 *l.*; it was stated particularly in those returns, and they were correct.

The *Chairman* requested that accurate tabular statements of the expenditure of the five Thames Companies, since the year 1852, might be handed in to the Committee.

1117. Mr. *Denison* (to the *Witness*).] Do you afford a Sunday supply from Chelsea?—Yes.

1118. And an every day one besides?—Yes.

1119. Not on every other day as it used to be?—No.

1120. Has any complaint been made to the Board of Trade, under the Act of 1852, about the quantity or quality of your water?—None whatever.

1121. And therefore no penalty has been laid upon you?—No.

1122. I presume that there has been no prosecution under the Act of Parliament?—None whatever.

1123. Lambeth, we have had it stated already, was the company which went above the point in 1848?—Yes, they were the first to move; I had been some time urging them to do it.

1124. The works were completed in 1851, if I remember rightly?—We went for an Act in 1848, but there was some little difficulty in obtaining money afterwards, but we got to work in 1852.

1125. The Lambeth Company came under the obligation, by the Act of 1852, to cover the reservoirs like all the rest, did they not?—Yes, they did.

1126. But they had no power to raise money for that purpose, had they?—They had not.

1127. What did they do then?—They borrowed money; the chairman, in fact, lent the money to do it, and we carried it out at once; that has been legalised since.

1128. And Lambeth also give a Sunday supply to some part of the district, do they not?—They do to all the poorer part.

1129. The other parts, I suppose, have cisterns big enough to carry them over Sunday?—They have.

1130. Again, with regard to them, there has been no complaint to the Board of Trade, no demand for constant supply, no prosecution, and, of course, no penalty?—No.

Cross-examined by Mr. *Williams.*

1131. In the answers which you gave my learned friend with reference to the supply, your attention was directed exclusively to the Thames, was it not?—Which answer do you speak of?

1132. The answers which you gave first, you said that the Thames was sufficient in quantity, and that the quality was very fine, did you not?—Yes.

1133. Was your answer with regard to supply confined to the Thames water exclusively?—Yes.

1134. Have you ever considered the subject of the River Lea supply?—I know the River Lea, but I have not considered it with reference to the waterworks.

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1135. Have you considered it with reference to the quantity and quality of the water?—I have not sufficiently to give evidence on this occasion. I know the River Lea is a very fine stream and very good water.

1136. My learned friend called that your general evidence as distinct from the evidence which you are called upon to give with respect to the Chelsea and Lambeth Water Companies; I ask, as part of your general evidence, whether you have formed such an opinion upon the quantity and quality of the supply from the River Lea as to enable you to form a judgment upon it?—I have not thought much upon it. It was not a district to which I was engineer; and unless I had been called upon I should not have thought of it. I only know the Lea as one of the public.

1137. But, as one of the public, are you cognizant of the fact that it has become very impure lately?—I am not; on the contrary—

The *Committee* suggested that the witness had been called only with regard to the direct supply from the Thames.

Witness.] If you ask me about the Lea, I know the Lea from the circumstance that I was umpire on the guages under the Act, which led me to examine it every month for two years. You say the River Lea is not pure; now I deny that, because I know the companies, and I have seen the works, and they have done an immense deal to divert foul drainage, and a large sum of money has been spent there; so that the Lea, as far as East London is concerned, is far more pure than it used to be a few years ago.

1138. Mr. *Wilkinson.*] Can you give any evidence as to the present state of the River Lea water, because, if you can, I will direct your attention to a passage in the report?—The only reference I can give to it is, that I know a great deal of foul drainage has been diverted from the Lea, and carried below the East London Works.

1139. But do you know that, in spite of all that has been done, the water is now so impure that large eels have been found in the cisterns supplied by the company drawing its supply from the Lea?—This is the first time I ever knew of an eel in bad water. On the contrary, you always find them very good judges, and in trying experiments you will find eels will even come over land to visit you in the evening regularly. They are very fond of good water.

1140. Then you rather infer that the presence of eels in a cistern is an evidence of pure water?—It is certainly not an evidence of impure water. You may as well say that fish, being in water, is an evidence of the water being impure. The fact is fish are as fond of pure water as we are.

1141. Do you think it a desirable system of supply which should allow eels to be found in several instances in the cisterns of the consumers?—It is not a desirable system of supply, but the question is, how to prevent it.

1142. I may assume, then, that that is not a proper system of supply?—Yes, but the puzzle is, even in the best constructed waterworks in the world, how to prevent it; and sometimes even in our covered reservoirs with the finest grating, I have been puzzled how the small frogs have got in, but there has been an accidental hole through which they have got; and so it is with eels, and what is very curious is, that they go in at this season of the year, probably not larger than a pin, and next year you will find them, perhaps, an inch in diameter, and there is no doubt that they grow in the pipes.

1143. The system of constant supply would be free from the objection at any rate of retaining the eel until he had so enlarged himself, would it not?—How should it do so?

1144. There would be no cistern?—But you do not suppose they came in the cistern.

1145-6. I believe the evidence is that they are bred in the cistern, and enlarged considerably. Let me read you this; this is a letter, at page 16, from a plumber to the editor of the "East End News": "Sir, seeing the paragraph in your last week's impression, respecting the purity of the water supplied us through the East London Waterworks, that it is thoroughly filtered, I beg leave to contradict that statement, more particularly——."

Mr. *Denison* objected to this being given as evidence.

Mr. *Wilkinson* submitted that the Committee had already allowed these papers to be received as evidence.

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The *Chairman* stated that the Committee must take it as a sort of diluted evidence.

1147. Mr. *Wilkinson.*] "I beg to contradict that statement, more particularly at this crisis, when cholera and diarrhœa are making such fearful ravages through these districts, in order that some steps may be adopted to guarantee a pure supply; now, the second week in June last, our water pipe was stopped up, and, as I am a plumber, I cut the pipe, and to my astonishment found a dead eel nine inches in length, which must have come through the above works." Do you think that a desirable state of things?—It is not desirable, but it is a thing that is totally impossible to prevent once in two or three years.

1148. Only unhappily, that is followed by another letter, and indeed by several others, with which I will not fatigue the Committee?—

Mr. *Denison* objected that these matters ought to be proved in a regular way, and not by letters and newspapers.

Witness.] It is very difficult to know how these things get in, and I have sometimes been puzzled; in the Green Park reservoir we know very well that we are filtering the water, and we take a great deal of pains in clearing it out very constantly, but still we find fish there, and I found that young men going out to fish in the Colne were in the habit of bringing them to London and letting them loose there; you might just as well have taken an objection to the Chelsea Company's water; the fact is, there are certain things which occur in waterworks, and you cannot make them absolutely perfect at all times.

1149. Mr. *Wilkinson.*] But would not the facts which you have noticed, rather prove that the existing supplies, whether from the Thames or from the Lea, are deficient in purity for the purpose?—I think not; it is not the fact of an eel being in the water that proves that the water is impure; after all the East London Company had done, I can only say, I believe the last time I was there the water looked much purer than it used to look in former years, and I know they have diverted an immense quantity of drainage from the stream.

1150. But are you aware that at present, the Lea is not dealt with in the same way as the Thames, in respect to control by the Conservancy, and so forth?—I believe the Commissioners have certain powers, but I do not know whether they exercise them or not.

The *Chairman* requested Mr. Wilkinson to confine his examination to points on which the witness came to give scientific evidence.

1151. Mr. *Wilkinson* (to the *Witness*).] You say that you have given your attention to the constant supply of water, and you instance cases in which you have yourself been concerned?—Yes.

1152. Now let me ask you a general question, aye or no; do you think a constant supply would be an improvement upon an intermittent supply?—Well, in some cases I should say it would, and in others it would not.

1153. Which cases would you put as the majority of instances, do you think there would be a majority in favour of the improvement, or the other way?—I should say that they would be about equal; the fact is, if both systems were carried out properly, they are both very good.

1154. Will you tell me why in some cases it would be an improvement, and in others not?—There are some inconveniences attending a constant supply. Occasionally the water is turned off, or it is directed to a particular point in case of fire or otherwise, and then the inhabitants go short of water. It is not a very comfortable thing to go to bed without water in the house.

1155. Can you point out any other inconvenience attending a constant supply?—When you want a larger quantity of water than the supply, you depend upon the extent to which it is allowed to dribble. There are a variety of inconveniences.

1156. You assume the constant use of this ferrule to which allusion has been made?—There would be a ferrule used to some extent.

1157. But if the ferrule were used to a moderate extent, there would be no difficulty in obtaining an amply supply at a moment's notice, would there?—I do not know about ample supply. Perhaps parties might want a little more than they got; but, practically, there are many inconveniences attending a constant supply.

1158. Practically

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1158. Practically, also, there are many inconveniences attending, as I understand you, an intermittent supply also?—No doubt of it.

1159. Are you aware that as many as twenty large towns have adopted the constant supply system?—I do not know the exact number, but I believe there are a great many.

1160. Are you aware whether the supply has been always constant; that is to say, whether there has been any change from the intermittent supply to the constant supply in those towns?——

Mr. *Denison* inquired whether constant supply, with or without cisterns, was referred to.

Mr. *Wilkinson* replied that his question referred to either the one or the other.

The *Chairman* suggested that it would be convenient if the question were put in one particular form.

1161. Mr. *Wilkinson* (to the *Witness*).] Let me ask you this. In the town of Ayr do you know that there has always been a supply on the constant system?—I have only been in Ayr twice in my life, and the last time I understood that they had got the water laid on, but I do not know anything about it.

1162. Bristol you have already said you have been concerned in, and you have given evidence on that point. Is that a constant supply with or without cisterns?—Except the water-closets, it is without cisterns; but there were old waterworks which the company took to, and the inhabitants in many parts of Bristol have retained their cisterns.

1163. I think I understood you to state that in Bristol the great source of waste was the abuse of water-closets?—It was.

1164. They propped up the valve as an imperfect way of draining?—Yes.

1165. *Chairman.*] In those cases of abuse to which you have referred, were there cisterns over the water-closets?—Yes.

1166. Mr. *Wilkinson.*] Are you aware that now there is an improved system of water-closets which prevents any abuse of that sort?—Yes. It was the invention of our own resident engineer at Bristol, and the company are recommending the application of it in all cases.

1167. Then if that recommendation be complied with it gets rid of one of the sources of waste to which you have alluded, does it not?—It does to a great extent, until the people can find out some way of dealing with it, and they will very soon do it.

1168. Mr. *Henry Baillie.*] Where does the water at Bristol come from?—It comes from a series of springs taken up at Chewton Mendip, about four miles from Wells, going south of the city; it skirts the Mendip Hills, taking up other streams at Harptree, and terminating at Dundry, where there is a large reservoir.

1169. Is the supply unlimited?—No, it is a very bad country indeed for water.

1170. *Chairman.*] What is the cost of that apparatus which would prevent that waste of water in the water-closet which has been mentioned?—I think it is about 16 *s.* for each water-closet. I do not know that it is a thing that would satisfy everybody, because, practically, it limits the quantity to about a gallon, and many persons think that is not enough to flush a closet; it is a very disagreeable thing not to have enough to flush the closet.

1171. Then, can you not fill it again?—No, you have to wait till it fills again.

1172. Then there is an intermediate chamber which has to be filled?—Yes, to some extent. All those schemes will have to be tested by practice, and people will have their own liking about it.

1173. Mr. *Wilkinson.*] At any rate the existing system could be altered by the application of this improved patent water-closet system?—Yes, there is no doubt means may be applied to reduce or prevent the waste of water, but you still have to deal with human frailty.

1174. I presume, whether under intermittent or constant supply, you must do do that, must you not?—You must. You cannot suppose a perfect state of things.

1175. That leads me to another question. The constant supply system being, as

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as you told my learned friend, open to the objection of flooding the waste pipe, have you formed a comparison between that system of waste and the waste to which the intermittent system is subject by the imperfection of ball-cocks, and the consequent flooding of cisterns?—I do not know that there would be much difference between the two. Probably the quantity of water wasted under the intermittent system of supply would always be greater than under the other.

1176. Now the third town to which I will call your attention is one which you have already mentioned, viz., Carlisle. That, also, was always upon the constant supply system, was it not?—Yes, from the time of the construction of the works, about 17 or 18 years ago.

1177. That same system is still adopted there, is it not?—Yes.

1178. And it continues to give satisfaction, does it not?—No, Carlisle is in a very unpleasant state about the water. The waste has gone on so long, and becomes so uncontrollable, that they do not know what to do with it. Last year the Board of Health, the Town Council, purchased the works, and they are now about making arrangements to endeavour to overcome the difficulty.

1179. To overcome the difficulty, but not to change the mode of supply?—I do not know what they will do yet, but I think not. I think they will, in all probability, adhere to the constant supply system, but it will be controlled to some extent. In fact it cannot go on as it has done. If they had all the water in the Eden they could not satisfy it.

1180. Will you explain to the Committee in detail what is done at Carlisle as to the house service?—The pipes are laid in, and terminated in most instances over the sinks. But it is not only that; there are certain taps in the streets, the markets, and places where passers-by, boys, and mischievous people turn on the water, and a great deal of waste comes from that. Altogether the system requires much greater attention, and to be followed out with much greater strictness than it has ever been. The fact is, the company was established without an Act of Parliament, and they felt the difficulty in the end.

1181. *Chairman.*] Are there water-closets in Carlisle?—Yes.

1182. And are they supplied with cisterns?—Not in every case; about half of them are.

1183. Then in the houses there is both a system of cistern and a tap for the domestic use?—Yes.

1184. Mr. *Wilkinson.*] Let me ask you one question with reference to the use of cisterns. Can you tell me whether or not, taking the average of towns supplied upon the constant supply system, the balance is not very much against the use of cisterns; are there many more towns supplied without the use of cisterns than with it?—I cannot tell you that off hand.

1185. Perhaps we may arrive at it in going through the evidence. Would it not be better, with reference to the supply, particularly of the houses of the poor, to avoid the cisterns?—No doubt of it; but then in the application of it you will, perhaps, allow me to state that there is considerable difficulty, and I state that from practical experience. In Westminster, some years ago, I felt great difficulty in supplying those poor neighbourhoods, and I recommended the company to spend a sum of money in laying down pipes and putting up standposts to serve the places, independently of cisterns, and I believe a sum of 800 *l.* was spent. But in the course of a few months, although great pains were taken not to put any brass work or lead work (it was all done in iron), somehow or other the middle men, or managers of the property, became indifferent about it, and they would not pay the water rent, many of them; then there was nobody to take care of it, and many of the parties denied that the company had any power over it after they had once fixed it; and in the course of three years it was all spoiled and rendered useless. There were scarcely a dozen places left out of 44. It is one of the most difficult problems to supply those poor neighbourhoods where there is nobody to take care of the things; the children take the least bit of iron or anything they can get; they endeavour to make money of it; there are hundreds of them idle in the streets, with nothing to pursue but mischief.

1186. But I presume, *primâ facie,* that the fewer the fittings the less the chance of mischief of that character?—No doubt; but, unfortunately, the fittings in sight, where the water is drawn, is what they apply to.

1187. With reference to cost, I need hardly ask you whether the first cost, under the constant supply system, would not be very much less than the first cost under the intermittent system?—No doubt.

1188. The difficulty which seems to strike your mind, and the mind of other witnesses also, is the expense attending the change?—Yes; and in the case of London, the difficulty of introducing what may be said to be absolutely the constant system, in spite of the inhabitants.

1189. Do you mean on account of the espionage system which would be introduced?—Yes.

1190. But I think you told my learned friend that the police prevent the wasteful use of water in America?—I think, if you will read those reports, you will find that it is not prevented. In the case of New York, there the council entreat the inhabitants to prevent waste. They are at their last drop of water; they have no means of supplying the inhabitants; and in spite of that even one of the newspaper editors there persisted in watering the streets, and would do it in spite of them, and said he had a right to do it, and although he was brought up and fined, he then pursued the system of writing scurrilous articles against the council.

1191. That is rather an illustration of American institutions, is it not, than of constant supply. I did not want to divert you to America, but only incidentally to ask you why you thought the police should not do effectually here what they do in America?—You would find a great difficulty on the part of the magistrates in London to convict parties. One gentleman, who is now dead, used to say, "It is no use bringing them here; it is for the benefit of health that they should waste water; I will not convict." Besides, look what a state of things it would cause to be continually summoning inhabitants.

1192. Inhabitants are continually summoned for other matters. That is one of the evils of legislation for large towns which you cannot well avoid. But with regard to Carlisle, are you aware that up to the present time the authorities of Carlisle are greatly in favour of the constant supply system, on the grounds of its advantage to health, its readiness in case of fire, and the absence of cisterns?—I have heard some of them express quite contrary opinions.

1193. Now then, let me take you to the next town, which is Coventry. Have you yourself had anything to do with Coventry?—I have not. I never was at Coventry in my life.

1194. Then I drop that. Can you tell us whether Croydon has always been under the constant supply system?—I know, for the last two years, they have been obliged to abandon it. It is in point of fact intermittent, and has been so for a long time.

1195. Then I may assume from the answers which you have given me, that you do know that Croydon was originally supplied on the constant supply system; is that so?—Yes.

1196. Now, as I understand you, you tell me further that it has been discontinued?—Yes.

1197. I must ask you to consider that carefully, because, is it not the fact that they have returned an answer in favour of constant supply, on the ground of its coolness, and its superiority for drinking?—It is shut off every night, and it has been frequently kept off for many hours. As engineer to the Lambeth Company, many persons have applied to me about the water, and I have said, "You are in the Croydon district, and you must go to them," and they say that they will come upon us and apply our Act of Parliament. The parish is named in our Act, and we are bound under The Waterworks Clauses Act to afford them a supply of water. At this present moment, in one of the suburbs of Croydon, quite close to our works, they cannot supply, and they do not supply more under the ground level of the streets, and they have sunk a tub, and the inhabitants go out there and take the water from it into the houses. It is a perfect farce about Croydon's having a constant supply. It is not any such thing.

1198. I did not understand you to say that Croydon has altered its system from that of constant supply to that of intermittent supply?—When you talk about its being constant, it is not constant.

1199. I understand you that there has been some modification which is new to me certainly, and which is inconsistent with the answer given, and that the supply is shut off in the night; is that so?—Yes.

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1200. Now I will take you to Darlington?—I do not know anything about Darlington.

1201. Do you know anything about Huddersfield?—No.

1202. You were engineer, yourself, to Kendal Waterworks, were you not?—No, I was not; I know that they have a constant supply, but I do not know any of the particulars.

1203. But you know the fact that they have always had a constant supply?—Yes.

1204. Do you know Lancaster?—I do not know it.

1205. Do you know the fact that they have always had a constant supply?—I have understood so.

1206. Do you know that Leeds has always been supplied on the constant system?—I do no know much about Leeds, but I know that it is a very badly supplied town. It is not an example which I should refer to.

1207. But is it not an example of constant supply?—Then it is not a successful example, because I have seen people carrying water in the streets constantly; I was there about a month ago, and saw it.

1208. Then you know, in fact, that it is an instance of constant supply?—Then it is an unsuccessful instance of constant supply. The Leeds people, at the present moment, are prosecuting a Bill in this House to increase the quantity, and in which I suppose they are endeavouring to improve their constant supply.

1209. But they do not propose in that Bill to change the constant supply into an intermittent supply, do they?—I do not know; it will change itself if they have not got a water supply; they are going to a new district.

1210. Do you know anything about Paisley?—I know that it is constant there, but then you know Paisley is a poor sort of place. When you talk about supplying a town like London, compared with Paisley, you may just as well compare it with a few country villages with a few stand-pipes.

1211. May we not fairly compare Paisley with Bethnal-green or those districts of London?—No; Paisley is not anything like so populous, and the inhabitants are in the factories all day there.

1212. But what do you mean by saying that it is a poor place?—The larger proportion of the houses are of the lower class.

1213. And they have always had a constant supply, and they appreciate it very highly, and they are satisfied with their supply; do you know that?—I do not know that.

1214. Do you know anything about Preston?—Yes.

1215. Has that always been on the constant supply system?—Yes.

1216. You are engineer for Preston, are you not?—No; I have been concerned in it many years ago, but I have not been to Preston for 15 years.

1217. Do you know Sunderland?—I believe that Sunderland has a constant supply, but I do not know any particulars about it; I understand that they are improving the works still.

1218. I have given you the names of 13 towns, in all of which the supply has been always constant; now let me direct your attention to some towns which I think you will consider to be towns of great importance, where they have actually changed from the intermittent supply to the constant supply; first of all, are you aware that that has been the case at Birmingham?—I have understood so.

1219. At Derby?—I have understood so there also.

1220. If you have been engineer in any of those cases and can give further details, then I will ask you further about it?—I have been consulted for some of those places, Birmingham for instance, but I am not in a position to go into details.

1221. Then I will not ask you to go into details, but when you can go into details, I shall be extremely indebted to you for such information as you can supply?—As regards Birmingham, Mr. Rolfe, their engineer, consulted me once, because he found such an enormous quantity of water wasted, and I told him that nothing but vigilant inspection would prevent it.

1222. Mr. *Kekewich.*] From whence do they get their supply at Birmingham?—The larger portion of it is pumped out from old coal-pits.

1223. Is it sufficient for the wants of the population?—I have heard it complained of, and I believe that they would be anxious to get another supply; it is not a very well supplied town.

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1224. Mr. *Wilkinson.*] Are you aware that Liverpool has changed its supply from the intermittent to the constant system?—Yes, and you cannot introduce a stronger instance; the probability is, that if London had done a similar thing, it would have been entirely without water; I happen to know a great deal about Liverpool, I was engineer to Liverpool, and constructed public works for them, and but for those works, Liverpool would have been starved; they were obliged of necessity to take the 1,250,000 gallons a day, which I obtained for them, and to take it for the supply of the inhabitants, instead of leaving it for watering the streets and drinking fountains, and so forth; really, strictly speaking, Liverpool has not had water to give either intermittent or constant supply, it is in reality what they call the Rivington Pike system, and it is a failure; instead of supplying what they expected it would do, viz., some 15,000,000 gallons, it only supplied 8,000,000 gallons, and at the present moment, they are going to enlarge and improve it; but Liverpool is one of the worst supplied towns in dry seasons in the kingdom.

1225. But still Liverpool has changed from an intermittent to a constant supply, and has no intention of changing back again to the intermittent supply, has it?—Necessity has made it intermittent.

1226. But, at present, are not all their efforts directed to save themselves from any such necessity?—It is not a good system in Liverpool. It has been carried to a certain extent, and then and there left, and I cannot say that I think that Liverpool is any copy of a constant supply.

1227. But still, are you aware that the inhabitants generally are very well satisfied?—By no means. There are very great complaints of the quantity and quality of water. I have been in a friend's house there when we had no water for breakfast.

1228. *Chairman.*] What is done in Liverpool, exactly which you say is a source of complaint?—Occasionally shutting off the water. The fact is, that they have not water enough to maintain a constant supply.

1229. Do you mean that they shut it off from the houses?—Yes.

1230. Is the communication pipe there laid into the house, and does it terminate with a cock?—Yes.

1231. It is also a constant supply into cisterns in many houses with an ordinary ball-cock?—Yes.

1232. And therefore if the ball-cock is out of order, the water runs to waste?—Yes; I do not know to what extent cisterns are used, but not to a very large extent, because it is only during the last seven or eight years that they have resorted to a constant supply.

1233. They did not then cut off the pipes from the cisterns, but left the old cisterns, as I understand, which were remaining?—That was so.

1234. Mr. *Wilkinson.*] As to Manchester, were you consulted at all?—I was engineer to the old company for ten years.

1235. Has that been a satisfactory change from the intermittent to the constant supply?—I believe that in the outskirts of the town a good deal of difficulty has been experienced with it, and also in Salford; but I believe that they have remedied that. They have laid additional pipes, and it is going on better.

1236. May I take it then that Manchester may be cited as an instance of constant supply which has now given perfect satisfaction?—I believe that in some cases they complain.

1237. With regard to Nottingham I think you were concerned there, were you not?—No, I had nothing to do with Nottingham.

1238. But do you know the fact that there has been a change from an intermittent to a constant supply? I understood that it was always constant. At least it was so for many years.

1239. Do you know Norwich?—Norwich was changed.

1240. Was that under your advice at all?—No.

1241. The Wolverhampton Works were constructed under your advice, were they not?—No; I have been concerned for Wolverhampton.

1242. Then you are aware that that has been changed from intermittent to constant supply?—I think that you could hardly call it a change, because when I was there investigating the works for one of the contractors, I do not think that there were more than 211 houses at that time laid on. It was some years ago. What they have really done there has been the adoption of constant service, but the number of houses was very small.

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1243. What do you know about Halifax?—I do not know anything about it, but I have been there.

1244. But were you concerned as engineer?—No; I was concerned for a gentleman in the neighbourhood as regards the construction of a reservoir.

1245. Is it supplied on the constant system, or has it undergone a change from the intermittent to the constant system?—I have understood it to be constant.

1246. With regard to Stockport, that is rather an important town, I think; were not you engineer for that?—I was engineer to the district works, and eventually they amalgamated.

1247. Is it supplied upon the constant system?—Yes; but complaints, until the works were amalgamated, were made about supplying the higher parts of the town, though I believe that they are all rectified now.

1248. Were you engineer to the Cambridge works?—I was.

1249. That is supplied on the constant supply system, is it not?—Yes.

1250. And I think there that they had reason to complain of great waste at first?—Very great indeed.

1251. Have they not taken better precautions since experience has taught them?—Yes, they have.

1252. Has the result of those precautions been a very greatly reduced consumption of water?—It has; I believe the quantity is now reduced to little more than 20 gallons a head.

1253. It was formerly 31 or 32 gallons, was it not?—Yes, but then that was from very great carelessness on the part of the manager; at one of the colleges they discovered an open pipe left running constantly into a drain, which I suppose must have taken away 20,000 gallons a day.

1254. But, however, by better management, they have reduced the consumption from 32 gallons per head to 20 gallons?—Yes.

1255. Is Newcastle also on the constant system?—I believe it is; though I do not think that it is a very perfect system, because I believe that there is a great waste of water there.

1256. Do you know anything about Lincoln?—I do not.

1257. Do you know whether it has been on the constant supply system?—I do not.

1258. Do you know Durham?—I do not know anything about Durham.

1259. Do you know Ashton?—Ashton always was so, I believe.

1260. And Bolton?—And Bolton also.

1261. Now just let me ask you this; it results from that that a very large proportion of those 26 towns (very considerable towns as you see) had been originally constructed upon, or had been changed to the constant supply system; that is so, is it not?—I cannot speak to it, but I suppose that it is so.

1262. Can you give me any instance where, after trying the advantages of the constant supply system, the constant supply system has been abandoned and the intermittent supply system taken up?—No; you know the constant service is comparatively a novel thing.

1263. I think that you have already told me that the first cost would be much less, and, therefore, to that extent it would be an advantage to the poorer neighbourhoods?—Yes.

1264. Of course, also, the pollution of the storage (which I have endeavoured to illustrate by the eels) would be prevented, would it not?—If I understand you in that case the eel was in the pipe.

1265. He was between the pipe and the cistern, and he seemed to have become fat and grown putrid. But, however, there is no doubt, is there, that the pollution of the storage would be entirely prevented by the constant supply without cisterns?—If you had no storage, of course there would be no storage to pollute.

1266. And also the water would be used by the consumer in a much more fresh, cool, and pure state than when it had undergone this detention in a cistern?—The gentlemen who instruct you have carried that a little too far. Now I have been somewhat in a position to ascertain about that cool state. I have often heard it asserted, and it is a natural idea, but like most natural ideas it is to be distrusted. It is a curious thing that in hundreds of instances I have tried the thermometer at our works, and where the water is delivered, and there is not a degree of difference; sometimes it is less and sometimes more. If you have pipes laid down in streets which are well watered no doubt evaporation does cool it

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it to some extent; but, practically speaking, it is really absurd to suppose that you get water cooler; you do not do it.

1267. *Chairman.*] That would depend upon where the cistern is in relation to the house, would it not?—No doubt; but generally speaking the water is of the same temperature.

1268. Mr. *Wilkinson.*] But still, the circumstances being similar, the water supplied almost direct into the glass of the consumer would naturally be more cool and pure, and fresh, would it not, than water delivered into a cistern, and then drawn out of the cistern subsequently?—In many cases it might be, but in some it would not.

1269. There are exceptions to every general rule. You would also escape the annoyance in frosty weather of the freezing and outburst of the pipes, and that would be another advantage of constant supply, would it not?—That is a point as to which I am at issue with those who say so. I say that it will not be so, because in cases where the pipes have been laid on the main, and we have constant pressure, in many works we find the water freezes just the same there as in the others. It is a fallacy to suppose that it would not, if it is in a still state, the ball-cock is shut and the pipe is full of water.

1270. But your mains are very strong iron pipes, are they not?—But they are laid so deep that the frost never affects them.

1271. Then, with regard to the communication pipes, would you not be able to lay them in a very much more protected state than would result from the consumers having the necessity to use a cistern, and possibly having to put that cistern at the top of the house?—It might be so, certainly, but I think then that they would freeze almost as much as they do now. It is a mistake altogether.

1272. But at any rate would it not certainly be a means of avoiding exposure of pipes or cisterns in the roofs, or near the roofs?—You will not want to carry them in the roof, and they are not in the roofs now. You have it in some of the better class of houses, but in the poorer classes of houses all the pipes lie on the ground floor.

1273. Would it be necessary to have that provision of taps where the cisterns are now used, for instance, at the top of a house, to supply a bath room, or to supply a house generally, and to have that service laid on all over the house?—You would want the same pipes and the same tap. Of course it would depend upon what the constant supply system is, and to what extent you carry it, but I do not believe that you would ever be able to do in London without cisterns.

1274. Giving me the advantage of the assumption that we can do without cisterns, then surely there would be a much less risk of exposure and of injury from frost, would there not?—Yes, but I wish to state that the communication pipe from the company's main into the house, and in the house itself, would be just as liable to freeze as it is now. If you suppose that you get rid of all the ill effects of frost, you are very much mistaken.

1275. I do not suppose that you get rid of all its ill effects, but at any rate it would get rid of all the effects resulting from the exposure in cisterns and the bursting of pipes, would it not?—But the pipes do not freeze in the cisterns. The cisterns have nothing to do with it.

1276. I presume that so far as the consumer is concerned, no more water would be fairly used under one system than under the other; the consumption would be the same, would it not?—That again depends upon circumstances. We will take the case of Folkestone. Folkestone, like Bristol, came to Parliament to get controlling clauses to give them two hours in the morning, and two hours in the afternoon. You asked me about towns, where they had gone back to the intermittent system. Folkestone is one of those cases; and in investigating that they found that the quantity of water used was so great when placed at the command of the people without control, that they had not water enough to do it; and in many instances they had very good evidence that parties had filled baths three and four times from the taps, and because they did not like the appearance of the water, they had let it run to waste again; and they came to Parliament and got controlling clauses, and they gave them a supply for two hours in the morning and two hours in the afternoon.

1277. *Chairman.*] But you had no cisterns?—No; but they have put them up since they came to get power to shut off the water from nine at night to six in the morning, and from nine at night to five in the morning in the summer.

1278. Mr. *Wilkinson.*] I suppose that you have compared the consumption under the two systems, have you not?—Yes.

1279. Supposing that proper precautions are used, do you agree with the evidence which I think has been given here, that the supply required would be actually less under the constant system than under the intermittent system?—It is my opinion that it need not be greater, but I do not know why it should be less; and my experience, so far as I have observed it, is that the constant and intermittent supplies would be about the same, assuming that proper control was used in both cases; but water supply is a thing where the greatest carelessness prevails, and it is very difficult to get two systems on the same parallel so that you can compare them.

1280. But of course the prevention of waste depends in great measure upon the surveillance exercised by the companies themselves, does it not?—Yes; assuming that they can do so; it is a very difficult thing to interfere with people's privacy.

1281. Now, would not the officers of a company be necessarily more anxious to prevent waste where there was a constant supply, than were the waste must necessarily be limited, because the supply itself was limited?—Not necessarily so, because you must bear in mind that the supply in a town is going on in some part of it all day long, and consequently if their attention was directed to one part of the city it would be to another.

1282. Surely the temptation to interfere with the waste would be much greater under the intermittent system than under the constant supply system, would it not?—I do not know that. Supposing that it was the same in both cases, there would be no inducement to interfere in one case more than another.

1283. Would not the loss to the company be very much greater under the constant supply system than under the intermittent supply system?—I do not know that. The intermittent system has its faults, no doubt, and its inconveniences, but the sanitary part of it must not be lost sight of. Introducing a large quantity of water within one or two hours of the day flushes out the drains, and that must be very beneficial in dry weather.

1284. Can you give me any information as to the average consumption of those towns which are within your own knowledge, and which are under the constant supply system?—I do not remember off-hand.

1285. Do you know whether in Lancashire and Yorkshire, in those towns which I have described, the average is not from 16 to 21 gallons a day for all purposes?—I do not.

1286. Can you give me any information upon that subject?—Not as to those towns. I do not know anything about them.

1287. Do you know that as to Manchester?—No.

Re-examined by Mr. *Burke*.

1288. I suppose that no person will contend for a moment that, if you have an unlimited supply of water, it is not a good thing that the public should have that unlimited supply?—There is no doubt of it.

1289. But you have, of course, to regulate your supply according to your means?—Yes.

1290. It may, therefore, be very possible, I suppose, in a small town with a moderate population, to give a constant supply, and, practically, an impossibility, where you have 3,000,000 inhabitants to deal with?—Yes.

1291. And that is the problem which you have to solve here?—Yes, and you must bear in mind that in the large towns where there is great wealth, luxury is not only studied, but is carried to the greatest extent.

1292. The legislation of 1852, upon which all the London companies have conducted their subsequent operations, was based upon the intermittent system, was it not?—It was.

1293. And upon a system at all events of providing cisterns?—Yes, cisterns were especially provided for in the Act.

1294. If you were to change in London to the constant system, there must be compulsory legislation, must there not, for the alteration of the fittings?—Yes.

1295. That compulsory legislation not affecting the companies alone, but the whole of the public?—Yes.

1296. Have you formed any estimate at all of the cost of altering the fittings throughout the whole of London?—Yes.

1297. Can you give any general average of it?—So far as my information goes about it, I should think that it may be estimated at about 5 *l.* in the lower class of houses; in the middle class at about 10 *l.*, and in the large class at 15 *l.*

1298. Taking that over the whole of London, do you know the number of houses?—It would be about 2,500,000 *l.* to 3,000,000 *l.*

1299. That would fall upon the present landlords of the houses, would it not? —Yes, there would be a good deal of expense outside, because we are different in some respects to the country towns. For any opening in the streets, we have to pay 1 *s.* 6 *d.* per yard, and in some cases 1 *s.* 9 *d.* It is becoming a very expensive operation in London to deal with the streets, and all that must be dealt with.

1300. Then if you were enabled, as my learned friend suggests, to limit the supply to the same amount of intermittent supply, the public would gain no advantage from increased supply under the constant supply system, would they? —Exactly.

1301. If they got a very much increased supply, I understand you to state that the present source would soon become deficient?—I believe that it would.

1302. If there were a large amount running to waste, that which you now look to as a supply for many years to come, would not last for so many years, would it?—Obviously not, and so far as my knowledge goes, it would be a very long time before you would be able to control the Londoners; they have been accustomed to use as much water as they like, and it is very extensively applied in certain seasons; in dry weather the quantity of water used in London is wonderful; in the dry summer of 1864 and again in 1865, in each of the works they suddenly jumped up a million gallons one day in a week.

1303. Under the constant supply system, if you had to regulate that, you would have to exercise a much closer inspection and control, would you not, than you do now?—We should.

1304. Do you think that that would be viewed favourably by the occupants of houses generally?—No; Londoners have a very great objection to persons interfering or demanding entrance into their houses, and you would find in many cases that it would be completely impracticable.

1305. Under the present system then, they have an adequate supply at present, only subject to what is represented on the other side, namely, the injury from storing in cisterns?—That is exaggerated very much; parties who are in the habit of keeping their cisterns in a proper state, do not find it.

1306. Practically, the water supplied through the cistern is generally as good in quality as when it comes into the cistern, is it not?—Yes; and when they are covered there is nothing to contaminate the water.

1307. With regard to the eels, if we take Loch Katrine as a large cistern which supplies Glasgow, that is pretty full of fish, is it not?—Yes.

1308. Eels may come down the pipes there in large quantities, may they not? —Yes; Glasgow is alluded to and stated as a success, and so on, but it must be taken with all circumstances; at the present moment they are duplicating the pipes; that proves to me that they are using more water; then it did not rest there, they have actually gone back to the River Clyde for the supply of the large public works.

1309. And as regards Liverpool, I think that you told us, what I can myself corroborate, viz., that the large works which they have executed there, called the Rivington Pike Works, are already becoming insufficient?—Quite so.

1310. And they are now contemplating in going to Bala Lake, at an enormous expense, to supplement that supply?—Yes.

1311. My learned friend carried you through a great number of towns in which the constant supply has been adopted, and he instanced Croydon as one; do you know that, practically at Croydon, the constant supply has been found an impracticability as regards raising any sufficient quantity of water?—I do know that, and there is this difficulty at Croydon, that they supply the low parts of the town, and the people use so much water there, and deal with it so unwarrantably, that they deprive the upper parts altogether of water.

1312. The supply depends altogether upon the quantity at the command of the person supplying, does it not?—Yes.

1313. Croydon, I believe, is what is called under a Local Board of Health?—It is.

1314. Here I find a placard, dated the 30th June 1866:—"Water supply until further notice; water will be supplied from the water mains of the Croydon Board of Health between the hours of 7 a.m. and 10 a.m., between 12 a.m. and 6 p.m., and between 8.30 p.m. and 10.30 p.m.," and it is signed by "Baldwin Latham, Engineer;" have you seen that?—I saw this placard in Croydon; in Croydon, in fact, it was an intermittent supply.

1315. Obviously, under the notice given by the Local Board of Health, it is an intermittent supply?—Yes.

1316. Now I find another one subsequent to that, dated the 25th August 1866, "Croydon Local Board of Health water supply: the inhabitants of Croydon are respectfully informed that, in consequence of the great demand for water and the unfinished state of the new waterworks, it is necessary, in order to furnish a supply of water to all parts of the district, to curtail the number of hours during which it will be supplied to the town; notice is therefore hereby given that, until further notice, the water will be supplied between the hours of 7 a.m. and 9.45 a.m., between 12 a.m. and 5.30 p.m., and between 9 p.m. and 10.30 p.m. The consumers of water in the district are urgently requested to co-operate with the Local Board in preventing any waste of water on their premises, as, in consequence of the great waste which is now taking place in many parts of the town, through defective taps, closets, and carelessness, much inconvenience is occasioned to many persons, and a very heavy, as well as unnecessary, expense incurred in having to pump a large amount of water that runs to waste." That is rather an illustration of what you have stated about the constant supply, is it not?—The fact is, they burnt their church down there; they said that they had water, but they actually burnt down the church.

1317. *Chairman.*] By a constant supply of water to it?—They had a constant supply of water, and the church was actually burnt down, although they were all there, and the water ought to have been supplied.

1318. Mr. *Benyon.*] Do you mean that the water was not there?—The water was there, but they did not know how to apply it, and the church was entirely burnt. It was a very valuable church; I think it must have cost 20,000 *l.*

1319. *Chairman.*] Do you think that the church was burnt because there was an inconstant supply at that particular moment?—Just so. In the outskirts of Croydon, Addiscombe, and Selhurst, and several of the other outskirts, they have not water at all.

1320. Mr. *Burke.*] It depends, in fact, upon the amount of water at the command of the party supplying, does it not?—Yes.

1321. My learned friend asked you whether under the constant supply system, you would not avoid the danger and inconvenience arising from the bursting of pipes. I read here a statement relating to Croydon again: "Mr. *Latham*—A great deal has been said respecting the necessity of cutting off the water supply during the night; but if I could see my way clear to keep the water turned on during the night, I should be happy to do it. I believe it is desirable, but under existing circumstances, it is impossible to carry out such an arrangement, otherwise we could not supply districts which we are now supplying. (*A Voice.* 'It is on neither night nor day; we have had no water to-day.') It is quite true, and I regret the circumstance, but I am unable to assist you. The sudden breaking up of the weather has caused a large number of the pipes to burst, resulting in an immense waste of water, which has disconcerted the whole of our arrangements." So that it appears that according to that, under the constant supply, pipes burst, as well as under the intermittent supply?—I happen to know a good deal about Croydon, and there were a great number of burst pipes at that time. The inhabitants were so badly off for water that when we put our stand-pipes up we employed additional men; and I said, "Now, carry water wherever the inhabitants want it." We made no distinction, whether they were our tenants paying us water rent or not, and we took it generally, because on the confines of that circle (*pointing to the map*), and, in fact, in some cases just within it, we had pipes, and we actually supplied them just after the frost to a great extent, and got very great credit for it. If that was to be a test of the effect of frost on the

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constant supply, it certainly was a lamentable one, for the number of bursts was immense.

1322. It is suggested to me that if under the constant supply a pipe bursts, you must cut off the whole supply to mend the pipe, must you not?—Yes, unless you put stop-cocks on, which they object to under that system, because they say it affords an opportunity of persons tampering with the pipes.

1323. You have stated to the Committee that your company, with regard to the supply to the poor, did their best by giving stand pipes to give an adequate supply?—Yes.

1324. And I presume that they are willing still to do so?—We do it on all occasions; in fact, there are general orders for the turncocks to afford a supply. We do not wait for reports and orders for that, but the men are to do it there and then, of course on good reason, and to report.

1325. You did do it, as it appears, but as you stated you were obliged to disuse it after a certain time, not from any fault of your own, but because on account of dilapidations and other things you could not carry it on?—Yes; there is very great difficulty, and in that case I ought to add, that the middle men or the managers of the property cut away the cistern and pipes right and left, and sold the whole of them; and I am not quite sure that they did not pocket the money.

1326. At any rate, no fault is imputable to the company?—No; it is one of our great difficulties to maintain the supply to those poor neighbourhoods. They let the things get out of order, and they go to others, and there they fight for the water.

1327. Mr. *Benyon.*] Was that the case in which 800 *l.* was expended?—Yes.

1328. Mr. *Burke.*] Whether the supply be constant or intermittent, you have an adequate amount of water for the supply of those poor districts?—Yes.

1329. And you would be quite prepared to furnish that supply, being adequately paid for it?—Yes.

1330. Then the adequate payment must be a compulsion upon those who take the supply, and the compulsion must be upon them to maintain the fittings?—That would be so, but there is very great difficulty in doing it, and there is very great difficulty in applying legislative enactment to it; and for this reason, the Local Board have representations made to them; one or two members of the Local Board discover that it will affect them and their friends; then they call upon the companies to know what they would supply it for, and in many instances we find that the action there ceases; they do not compel the parties to take the water. In one district, just now, I know that there are about 47 cottages unsupplied with water.

1331. Colonel *Hogg.*] What district is that?—The Honourable Member will, perhaps, excuse my naming it; it would lead us into collision with parties. It may become public; it is a notorious case; but they profess to have a great deal of consideration for the poor, and we actually find that the houses belong to them, and they do not spend a penny.

1332. *Chairman.*] Is that in the Chelsea or in Lambeth Company's district? —It is in the Chelsea district.

1333. Mr. *Burke.*] Any deficiency in the supply of water to the poor, points rather to the necessity of legislation as affecting landlords, than to legislation affecting the company; the company do what is required of them, do they not? —Yes, there is immense difficulty in dealing with the managers and owners of that class of property.

1334. You stated two cases, Folkestone and another, where they had been obliged to substitute cisterns after introducing first of all constant supply?—Yes; they came to Parliament, and got permission to alter the hours of supply, and in fact to make it intermittent.

1335. Supposing that the object which is supposed to be in view here be obtained, viz., to do away with cisterns in London, were not to answer, the whole expense of 3,000,000 *l.* would have to be gone to again in reinstating the cisterns, would it not?—Yes.

1336. *Chairman.*] Are you acquainted with the valley of the Thames?—Yes; I have known it for many years, and have been professionally engaged upon it for many years.

1337. Are you acquainted with the geology of the valley of the Thames?—To some extent.

1338. Do you know whether the valley of the Thames is the largest, or nearly the largest gathering area of water in England?—It is very nearly the largest, I believe. It contains, as I mentioned, above Kingston, 2,500,000 acres, and you are aware that it is a very flat valley, extending to the chalk hills on one side, and to the oolitic hills of the Cotswold on the other side.

1339. Do you know how it is suited relatively, as compared with other valleys, for the collection of water, or whether it is more suitable than other valleys in England for that purpose?—It is not the best for the construction of reservoirs.

1340. I mean as regards its geology?—It may be termed a limestone district.

1341. Are there minerals in the valley to a greater or less extent than in most other valleys, which would be likely to injure the character of the water?—There are very few minerals.

1342. Have you directed your attention to the quantity of water flowing in the Thames, except in the dry season, which you have mentioned?—I have never measured it, because we know from the rise of the water. I register every morning the height of the Thames, and I have approximated to the quantity. I know that it gets up to a very large volume.

1343. The quantity coming down the river in what are called floods, is enormous, is it not?—It is enormous; it is a very large quantity. I have known it to rise 11 feet 10 inches above the summer level.

1344. In quantity, how much greater would that be than the water in the dry season which you have mentioned, I think, as 500,000,000 gallons?—I should think it would be at least 50 times greater.

1345. And you take out in one day 50,000,000 gallons?—At present we take 50,000,000 gallons.

1346. Mr. *Henry Baillie.*] Is that all the Thames Companies?—Yes, all the five companies.

1347. You take about 10,000,000 gallons a piece?—Yes; that is at present.

1348. *Chairman.*] Then enough water would flow down one day in a flood to supply the metropolis for a year at that rate?—Yes; the quantity coming down is enormous. We have had very heavy floods on the Thames this last year.

1349. Down to a comparatively recent period in this year the Thames has been in flood, has it not?—Yes; they have not been heavy floods, but the rain has fallen so as to produce a height of two feet six inches and three feet above the summer level; and that we do not think an extraordinary flood.

1350. And how much greater would be the flow of water in an ordinary flood in the Thames, compared with the flow in the dry season, taking 500,000,000 gallons as the standard in the dry season?—About double is a very common flood, and we also very often have it five or six times as great as the ordinary flow.

1351. Therefore, as regards the volume of water coming down the Thames, is it your opinion that there is a sufficient quantity of water to be stored if it were required to store it in the valley of the Thames?—Yes; but I do not think that it would be at all necessary for many years.

1352. If it were necessary it would not be a question of the quantity of water, but a question of the works for storing the water?—Exactly.

1353. Do you consider that the Valley of the Thames offers any facility for storing water in such quantities?—There are certain cites up in the higher reaches where they could get very good sites for reservoirs above Oxford, and there is one place below Oxford.

1354. To what extent could that storage be made?—I should think that there would be no difficuly in getting 70 or 80 days' water. That would be 100,000,000 gallons.

1355. Colonel *Hogg.*] Do you mean at Pangbourne and the locality?—We should go above Pangbourne. A very nice stream comes in at Pangbourne.

[The Witness withdrew.

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The *Chairman* stated that it would be convenient that the Metropolitan Board of Works should furnish the Water Companies with a statement of the points which they proposed to raise in their opposition.

Mr. *Cripps* said that such a statement should be furnished to-morrow morning, but that he feared it would not be practicable to furnish it that evening.

Some discussion arose as to the course of procedure.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Friday, 17th May 1867.

MEMBERS PRESENT:

Mr. Ayrton.	Colonel Hogg.
Mr. Benyon.	Lord Frederick Cavendish.
Mr. Headlam.	Mr. Kekewich.

ACTON SMEE AYRTON, Esq., IN THE CHAIR.

Mr. *James Simpson* recalled; and further Examined by the *Committee*.

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1356. *Chairman.*] I THINK you gave us your opinion as to the practicability of storing the surplus or flood water of the Thames in the valley of the Thames above Hampton?—Yes.

1357. Have you any idea of the probable expenditure it would be necessary to incur in storing water to any large extent in the valley of the Thames above Hampton?—That would depend entirely upon the magnitude and number of the reservoirs.

1358. Have you considered the subject so as to be able to give us any general ideas about it without going into technical details?—I am not, further than going and visiting the spots.

1359. What is the general conclusion at which you have arrived upon that subject?—I have thought that if we could get four or five reservoirs at an expense of about 250,000 *l.*, it would be sufficient.

1360. How much water would you, do you think, be able to store?—We should be able to store about 50,000,000 gallons for 100 days.

1361. That would be 5,000,000,000 gallons?—Yes; but I think many years would pass by before that would be requisite, for there is always a great quantity of spring water in the Thames; very large quantities come from the oolite; the Oxford canal is supplied with that water. There is no doubt that that would render the magnitude of the reservoirs less, and until the companies take a larger quantity of water, and more than they do now, the reservoirs would be unnecessary.

1362. When the river is low, the valley of the Thames gives back into it a large volume of water, does it not?—Yes.

1363. The valley having been in flood at certain times, I suppose there is a greater amount of water stored in the soil?—Yes; but of late years the operations of surface drainage have diminished that to some extent.

1364. Is a large portion of the valley under water in times of flood at the present time?—Yes.

1365. Do you suppose that any great quantity of that percolates into the soil?—Yes; and it gives it out slowly.

1366. That is, into the bed of the river when the water is low?—Yes.

1367. Is that the reason which you think accounts for the stream being so perennial as it is?—Yes; that in addition to the constant springs from the nature of the stratification.

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1368. In that season of the year is the water so given out very pure, the water having so come from the soil ?—Yes ; it is very pure.

1369. In the dry seasons, as to the character of the water, it would probably be purer than in a season of flood ?—Yes ; but there is a canal near Cirencester, and there it is the reverse of most of the canals in the country, for there the reservoirs are under ground, and they pump the water in the dry seasons, in order to maintain their lockage ; they have a very large engine near to Cirencester, with which they pump in dry seasons.

1370. Have you had your attention directed to the difference in the quantity of the house supply in the case of the two companies with which you are connected ?—Yes.

1371. Have you observed that one company supplies 8,000,000 gallons to 26,000 houses, with an estimated population of 170,000 persons ?—Yes.

1372. And the other company supplies 8,950,000 to 37 houses, with a population of 225,000 persons ?—Yes ; I should think there must be a larger proportion of smaller houses in that district—the Lambeth district ; the other is the Chelsea district.

1373. Is it on account of the larger proportion of small houses that the supply is so much less per house per head ?—Yes ; and I think that in that district the inhabitants are away from home all day, and there is not so much water used.

1374. Is there a considerable difference in the consumption of water in the larger than in the smaller houses, per head ?—Yes ; from the circumstance that the inhabitants are not at home to use it.

1375. I suppose there are no baths in small houses ?—There are very few.

1376. Are there baths generally in the larger houses ?—Yes, they are becoming very universal now down to houses of only eight rooms.

1377. Are there separate water-closets in those small houses ?—A great number of them are without, but the local Boards have been compelling the construction of them.

1378. Do you consider that the Lambeth supply is insufficient in quantity at the present time ?—No ; whenever there is any complaint made of want of water, our attention has been directed to it, and the Board are very anxious upon that point in every case ; the pipes have been enlarged, and a great deal has been done since the Act of 1852.

1379. Have you considered what would be the best mode of arranging to supply all the small houses with water ?—I have thought of a variety of ways, and I believe that the only way would be, to do it effectually, to have a constant supply from the mains, by pipes laid down purposely. I do not think it would be advisable to have it without cisterns entirely, but no doubt a very efficient supply could be given by that means.

1380. Do you mean that it would be requisite to provide cisterns for water-closets ?—Yes ; but I would treat the subject irrespectively of water-closets, and say, for really the strict domestic consumption. I think it would be an advantage to have a few gallons of water to fly to in case of need, independently of the companies.

1381. How would you deal with the matter, irrespectively of the water-closets ?—I would have separate cisterns in the larger class of houses ; now and then, from the position of them, it is not a nice thing to have a cistern over the water-closet to draw the general supply from. We recommend in all cases separate cisterns.

1382. Would you have a cistern for the water-closet in each house, and a separate tap kept constantly supplied for drinking purposes ?—Yes ; I have thought that it might be done in many cases by putting one general tap for 10 or 12 houses, but there is so much objection—and it is commented upon in the report on the Health of Towns—to the assemblage of persons in the street, because it leads to so much disorder. I think it ought not to be encouraged, but should be done away with, and that they should have the water provided within their own doors.

1383. You would pass a pipe through the wall of the houses, and give a tap in each ?—Yes ; and, if possible, I would have that pipe go through the premises supplied, and no other ; but there are so many difficulties, for where there are people drawing water from the same pipe, they spite each other, and they take the water when they ought not.

1384. You see no difficulty in some arrangement being made by which all these houses might be supplied with water?—I do see one difficulty, because in some of the districts we cannot let the water remain on now without great risk of flooding the properties. The drainage is by no means complete at the present time. The Metropolitan Board have carried it out to a certain extent, but by the district Boards there is a great deal still to be done in details; Chelsea is not complete, and Westminster has done very little, too, and there are many places where we should do injury to property to let the water remain on.

1385. What would you do in those cases?—It must remain without; there must be very strict supervision of the water; perhaps by shutting off the water at night, we might overcome the difficulty. A great deal of co-operation is wanting on the part of landowners and occupiers of houses, and the company must have more power than they have for inspection, and so forth. Then comes the question, who is to be at the expense of all this? In the case of men who own houses under a one or two years' lease, or the remnant of a lease, you cannot expect them to go to an expense of 8*l.* or 10 *l.*

1386. Do you mean that it is only out of consideration for the landlords?—It is a difficult subject to deal with; and the fact is, that there are many cases in Westminster and Chelsea where there is great difficulty to collect any rents to support the houses at all, and you hardly know what is to support them; perhaps the parties get the rent in one week, and then in two or three weeks they do not get it.

1387. Mr. *Headlam.*] With regard to the cisterns from which the water-closets are supplied, does the impurity rise to the cistern to the water-closet?—Yes.

1388. To what height would it rise?—It gets into the cistern, and if it is a covered one it becomes most offensive when you take off the cover. All that is done in a bad way; they take the waste pipe down into the drain without trapping it, and the effluvium comes from the drain as well; it is very faulty to have it so.

1389. You consider it is very objectionable to take any water from the cistern of the water-closet for any other purpose?—Yes.

1390. Mr. *Kekewich.*] There is a great overflow of the Thames at different times in floods?—Yes.

1391. That is in consequence of the lowness of the banks and the weirs chiefly?—Yes.

1392. From backing the water up?—The banks are very low, and the stream is not large enough to take the highest floods.

1393. Although that, in a sanitary point of view, may be prejudicial to the health of the inhabitants, or prejudicial to agriculture, yet you think as far as the supply of water is concerned, that the whole of that is returned again in dry seasons to the bed of the river?—Yes. The bed of the Thames contains very large tracts of gravel and porous strata which fill up, and then give out for many weeks after a flood.

1394. In fact that overflow is very beneficial, with reference to a supply of water in dry seasons?—Yes.

1395. With regard to cisterns, do you think it is possible to place one large cistern for the supply of a block of houses?—Yes, it is frequently done; we have several cases of that kind.

1396. Does that plan answer well?—It does, to some extent; but sometimes the parties quarrel and let the water run to waste. Generally speaking, it is a good mode of supplying houses.

1397. Colonel *Hogg.*] Do you mean poor houses?—Yes.

1398. Mr. *Kekewich.*] Where the expense would be very great, there would be, I suppose, a separate cistern to each house?—Yes, not only as to the expense, but from the way in which small houses are constructed it is advisable to have the cistern outside; but latterly, where the Lambeth Boards have enforced the establishment of water-closets, they are obliged to introduce them in many instances.

1399. Have you visited the large lodging-houses which have lately been erected by Mr. Waterlow, in the City of London?—Yes.

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1400. They are supplied, are they not, by one large cistern?—Yes; I believe in many cases they have a cistern on each floor. We have one of these lodging-houses in our district at Chelsea, Miss Burdett Coutts's, and they have cisterns there for each floor; they are supplied by meter, and the water is constantly on. But our observation leads to this, that since the house has been rather more fully occupied than it was at first, they use nearly seven and three-quarter gallons per head per diem.

1401. Is there any legal obligation upon the owner to fix a cistern to supply the water-closet?—According to "The Metropolis Waterworks Act" the company have power to approve of the cistern amongst other things, and they need not take the water on till it is done.

1402. In fact, you think there would be a great saving of water if the cistern system was universally adopted?—Yes; and I think there has been a very great mistake made upon this point; I mean in supposing that these cisterns are so filthy. It is not the result of our observations that they are so; there is no doubt that many negligent persons have little butts that they never clean out; but generally speaking, and particularly since the introduction of filtered water, great attention has been paid to the cleaning out of cisterns, and indeed, in the case of club houses and such places, there is an annual contract with the plumber to do it.

1403. You are, no doubt, well acquainted with self-acting water-closets?—Yes.

1404. Are they in general use now?—There is a great number of them in our district.

1405. Do they occasion more waste of water?—No; they are very economical in that respect.

1406. Colonel *Hogg.*] I think you are rather in favour of a constant supply in the poorer districts?—Yes, and I would go great lengths to give it, but you cannot always do as you wish.

1407. With a constant supply, do you think it would be better to have cisterns, or to be without them?—I certainly would not give them up.

1408. Is it possible, do you think, to make arrangements for the inspection of cisterns in order that they should be kept clean?—Yes.

1409. Would you give that power to the local authorities or to the inspector of the Water Company?—I have a strong opinion upon that, that if it were done by those whose business it was to do it, it would be better attended to, and some inspection of that kind no doubt is desirable.

1410. You would put that duty on the inspectors?—Yes.

1411. Would there be less labour and cost occasioned by a constant supply than by an intermittent one?—That depends entirely upon how it would be carried out; it is a good plan, with this remark, that we must have the waste defined before we can know what the cost will be. I believe, in strictness, that a constant supply ought not to be attended with greater expense.

1412. Are not the pipes less liable to damage from being constantly full than from being sometimes full and sometimes empty?—If they are strong enough at first, we do not know that they require anything to be done to them; and they will go on from year to year as they do now, but the difficulty is in dealing with the pipes as they are now, and in changing the system they must be stronger than they are now.

1413. In case of fires, are not hydrants very useful?—There is no doubt of it; if we could keep them in order, they would be, but that is one of the difficulties in London in consequence of the great crowds in the thoroughfares and the great traffic that there is; it is not very obvious at first that they would answer, and they would be very expensive.

1414. Are they not used in Manchester?—Yes.

1415. Do not they save the fire engines very much?—Yes, wherever there is pressure they do.

1416. Then why should they not answer in London as well as in Manchester?—The streets in Manchester, in many cases, are much quieter than the streets in London.

1417. You think they would be useful?—Yes.

1418. You stated yesterday that in opening the streets you pay 1 *s.* 6 *d.* a yard, and sometimes 1 *s.* 9 *d.*, and that it is becoming a very expensive operation in

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in London to meddle with the streets. Can you give the Committee any idea how to deal with that matter?—No; there is none but to pay the money.

1419. Do not you think that subways would be a useful mode of diminishing the expense?—I have no opinion of subways. I do not think I would do that. The fact is, I do not know how you are to apply subways.

1420. If a pipe was once laid in a subway, it would be much less trouble to get it out if necessary, than to take it up out of the street?—It is not that class of pipe that we dig down to: The larger part of the operations in London are in the case of leaden pipes, and with respect to the fire plugs.

1421. It is easier, is it not, to get at a pipe in a subway, than to take up the street?—No doubt of it; but I do not know how you would apply the pipes in subways. For instance, take Parliament-street, there are about 17 or 18 lines of pipes, and I do not know how you are to get them into a subway.

1422. I am supposing that there is a subway that would hold the pipes. Would it not be more convenient to have them in a subway, than to have continually to break up the streets to get at them when necessary?—Yes; if you can keep the gas out.

1423. Supposing the gas is not there?—That is, I think, impossible; for in London, according to my experience, the gas gets into every open space. There is not a surface into which it has not percolated many feet, and in fact the whole of the substrata of London have been affected by gas.

1424. Would it not be less affected, supposing the subway was ventilated?—The gas would come out.

1425. Would it come out at places properly ventilated?—No; there is a great difficulty, indeed, in ventilating sewers and subways; it is a subject upon which I have thought a great deal. I was consulted by the Danish Government for Copenhagen, and I went into it very particularly there: they had an idea that by putting up plenty of shafts that would do it, but it did not do it; the foul air remains in, and so far as carbonic acid is concerned, it will remain in and you cannot move it; that is a very difficult question; nothing in England is more difficult than even ventilating houses, where you have every appliance.

1426. *Chairman.*] I suppose that all ventilation depends upon changing the balance of the air, and the temperature varies so very much, that it is impossible that any one system can answer for the different states of the climate?—Yes; you may make use of any means, but the difficulty is to make the draft; it is not a shaft stuck up which will cause motion.

1427. Colonel *Hogg.*] Then you have never laid any water pipes in subways yet?—I have seen them, and I know that in Paris when I was there waiting to investigate them, for three weeks we could not get into the sewers on account of the gas.

1428. Was not that on account of improper ventilation?—The ventilation was pretty good so far as the openings went, but you cannot move.

1429. *Chairman.*] You must use mechanical means to move the air, I presume?—Yes; and then it is an exceedingly difficult thing; if you can only conceive that there are hundreds of miles around London to ventilate; they tried it, and everybody supposed that they would do it by connection with the furnaces of the soap works; but the result was, that they went to work at about nine o'clock in the morning, and the pressure of gas coming on about four o'clock, it filled everything up, and eventually reached the sewerage which was working into the furnace, and an explosion took place and blew all the furnace down.

1430. Where was that?—At soap works in the Borough of Southwark; one of the most difficult questions I know is the ventilation of that class of buildings and of subways.

1431. Mr. *Benyon.*] But, in fact, at Paris the gas pipes are not now in the subways, are they?—They have been removed, I believe.

1432. Colonel *Hogg.*] Do the water pipes remain?—The water pipes remain.

1433. Mr. *Benyon.*] But if the water pipes in London were to be the only pipes in the subways, the expense of the subways would fall entirely upon the Water Companies, would it not?—Yes, and I very much question whether the openings of the Water Companies, on their own pipes, would be worth while, because it is really a bagatelle; in the Chelsea works it does not cost 200 *l.* a year.

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1434. Of course it would be the mains which would be put into those subways?—Yes.

1435. Are you at all aware of the means which it was proposed to adopt for the purpose of getting those large pipes into the subways?—There were a variety of means discussed; the principal were to make lateral openings to carry them down, and to make, in some cases, long openings in the top.

1436. Which, of course, would be attended with enormous expense?—Just so, and not only that, but it would be very inconvenient to open at any time; they would be much larger than the common openings, many of which are done between five o'clock in the summer and ten o'clock.

1437. And of course those holes would have to be made through brickwork, which would have to be restored, and which would be a greater expense than removing the ordinary pavement of the street?—Yes, unless you had a covering of iron, which would be more expensive.

1438. Colonel *Hogg.*] Why could not the water pipes come in at the end?—There is such difficulty in getting them along the end of the sewer; where you have half a ton weight you require considerable means, and you want room to do it.

1439. Are you not aware that in Southwark-street there are pipes now laid through the length of it in a subway?—There are small pipes there, and I understand that they have been laying some more as an experiment, but up to this time that cannot be received as anything else but an experiment.

1440. But you have not had to lift up the subway at all get those pipes in?—It is evident that they must have holes to get in; they built that sewer without putting any pipes in at all.

1441. Then they put in the pipes after it was built, without breaking it open, did they not?—They are not pipes in connection with works; they are mere experiments.

1442. They are good sized pipes, are they not?—I think that it is a mere trial; I do not think that anything very practical has been proved yet.

1443. Mr. *Benyon.*] You were asked a question about the flood-water of the Thames; the floods are greater at Oxford and in that country than they used to be, are they not?—I believe that they are. What is described as the shoot of water after rain is much quicker from the direct drainage.

1444. You think that it does not arise from the silting up of the bed of the river at all?—That may have something to do with it; all those streams, it has been proved of late years, are filling up.

1445. And that may be the case with the Thames, may it not?—Yes, exactly.

1446. And therefore that would produce an apparently greater quantity of water, though in reality the quantity of water remains much about the same?—Yes. Our celebrated engineer, Smeeton, made that observation on the Thames itself when he was talking about the Thames being cleared by flood. He said that it would probably take as long to clear it as it would to accumulate, and that must have been going on for 700 years.

1447. You were mentioning the fact of fish being in the water, and you stated that that was evidence of its being pure water. I presume that you do not mean to make that as an absolute statement that the existence of fish in the water is a direct proof that the water is good for human beings?—No.

1448. It must be taken with some modification, I presume?—To some extent; but, generally speaking, you will find that fish like pure water. I think that the instance is notorious in this river; we have fish now, I know myself, up the river, coming since the drainage has been taken below, and become more diluted.

1449. You stated that the waste of water by the intermittent supply was greater than the waste by constant supply; did you mean that as a general proposition?—No; I should say that it is entirely as you deal with either supply; in many cases it has become greater in one than in the other; in the case of Boston, in the United States, which I mentioned, it had got up to 97 gallons per head per diem with the constant supply, and at New York they actually took the whole quantity which was appropriated for four times the population.

1450. And to what do you attribute that waste?—To absolute waste, and to the improper use of the water by the inhabitants.

1451. Then, may I take it that you mean that where the fittings for the constant supply are in perfect order, and where those for the intermittent supply are in perfect order, the loss by waste would be much about the same?—Yes; I do not believe that there would be a very great deal of difference.

1452. When they were each of them in perfect order?—Yes.

1453. Your attention was called to several towns, Carlisle and others, in many of which you were employed as engineer; where there any existing waterworks there?—At Carlisle there were not.

1454. Then in several of those towns there were no waterworks before?—No.

1455. And yours were an additional introduction of waterworks?—Yes.

1456. Therefore there were no alterations to be made?—No, and that rendered the application much less expensive.

1457. Lord *Frederick Cavendish.*] The chief objection which has been urged against the constant supply is the danger of waste, is it not?—Yes.

1458. Is there any insuperable difficulty in measuring the quantity of water supplied to each house?—Meters have only been perfected for the last seven or eight years, and we have not yet been able to get a small meter that we can rely upon. If we require to measure 15 gallons an hour, we cannot do it. There is no reliable meter that I know of that would do that.

1459. You think that it is too difficult a problem?—It is not only too difficult a problem, but it would be too expensive. For instance, in many cases it would amount to double the water rent of the house.

1460. But, supposing the manager of a Water Company had reason to believe that in any particular house there was any great waste of water going on, would it be impracticable for the Water Company, in such a case, to put up a meter if they had power to charge extra for excessive waste?—No; we are not in a state to do it, until we get a more perfect meter for small quantities.

1461. Should you see any objection to giving the Water Companies power to charge extra in case of excessive consumption?—No other objection, except that that the public cousider that they pay already too much for water.

1462. If they paid a fair rate for a fair consumption, there could be no objection, in case of excessive consumption, to charging them extra, could there?—It would cause very great dissatisfaction; in fact, it is one of those things where the public like to be as uncontrolled as possible. They exhibit great impatience, in case we interfere with them in any way.

1463. But such an enactment would prevent the evil which we have heard of, which has taken place in Boston and in New York, would it not?—It would; but then it would lead to great complication, because the contract in many of the small houses is made by the landlords, who pay for the houses whether they are full or empty, and they get a deduction of say 20 per cent. discount; and they would not be the parties to proceed against, in case of waste of water.

1464. But would not the landlord take very good care to check his tenant in a wasteful consumption of water, if he had to pay for it?—He might, but it is a long way before we get at them.

1465. *Chairman.*] Will you explain what is the necessity for having the brass fittings, and why iron fittings should not be used?—In many cases, iron fittings are used, but the water in a wrought iron pipe rusts; and in many cases it is not manufactured in a very good way; it is a common gas pipe, and where they manufacture a thin pipe, it is what we call butt-welded, and it is so thin that it does not hold sufficiently together to bear pressure. In the Lambeth district, I should think within the last 10 years as much as 500,000 feet of that pipe have been put down, and nearly the whole of it has been removed and leaden pipes put down. Then, there is a difficulty in laying iron pipes about; the turns and undulations altogether make it much more inconvenient.

1466. Have you examined the system which is in force in the east end of London of measuring a piece of pipe which is introduced?—I have not examined it, but I have heard it spoken of, and I have seen the apparatus.

1467. What is your opinion of it?—It is one mode of supply, but it is one which, I think, generally speaking, the public would not be satisfied with; they require to draw larger quantities at a time than that would admit of. I have never thought of admitting any less than a one-eighth of an inch pipe, and more frequently a quarter of an inch pipe.

1468. Does that admit of a large amount of waste beyond the ordinary consumption of a house?—It does. At Cardiff, at this moment, they are complaining

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plaining very much of the waste of water, and, I think, very probably, that they will have to do something to prevent it.

1469. Is it delivered there through an orifice as a constant supply?—Yes.

1470. Through a pipe of what size?—Most of the pipes are half an inch, and in some cases three quarters of an inch.

1471. Does that admit of a very large amount of waste?—Yes.

[The Witness withdrew.

Mr. *Joseph Quick*, called in; Examined by Mr. *Clay*.

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1472. You are Engineer to the Southwark and Vauxhall Water Company, are you not?—I am.

1473. And also to the Grand Junction Water Company?—Yes.

1474. You have had considerable experience in the construction of water-works, have you not?—I have.

1475. For how long have you acted as engineer to the Southwark and Vauxhall Water Company?—For 30 years.

1476. And to the Grand Junction Water Company?—Twenty years.

1477. So that you are well acquainted with the works and the system of supply of both the companies?—I am.

1478. First, as to the Southwark and Vauxhall Water Company; have you seen the printed return sent in by that company to the Committee?—I have.

1479. Do you confirm the statements made in that return by either company?—I do.

1480. Before the passing of the Metropolis Water Act of 1852, I believe the Southwark Water Company obtained their supply from the Thames at Battersea, did they not?—They did.

1481. But by that Act they were prohibited from taking their supply below Teddington Lock?—They removed the source of supply to Hampton.

1482. For how long do you think that the existing power of the company for obtainining water will meet the requirements which are likely to be made upon them?—I should think for 40 or 50 years.

1483. Has any request been made for constant supply by the inhabitants of your company's district, in accordance with the provisions of Clause 15 of the Metropolis Water Act of 1852?—There is not.

1484. But supposing the tenants to have sufficiently large cisterns, the supply at present under the present system is practically constant, is it not?—It is, if the cisternage is sufficiently large.

1485. Where do you find any difficulty in the supply of water; do you find it in the poorer dwellings?—The poorer dwellings, for want of proper cisternage, are very much distressed at times.

1486. You have a very large number of poor dwellings, I believe, in the Southwark Company's district?—We have; a very large proportion of the houses are of the poorer class.

1487. Have you endeavoured to amend the condition of those poorer houses with regard to their water supply?—I have made several suggestions to the landlords from time to time, but there is always difficulty in getting them to lay out any money for the improvement of their cisternage or storage of water for the poor.

1488. You have found difficulty in inducing the landlords to improve their cisternage?—Yes; I suggested some time ago a cistern as an auxiliary supply.

1489. You have suggested a cistern?—Yes.

1490. Will you be kind enough to explain that cistern to the Committee?—Yes. (*The Witness handed a sketch in, and described the same to the Committee.*) I should leave the present tanks and butts, or whatever they may have at the back of the house, as an auxiliary, and a large auxiliary cistern for the service of all the houses.

1491. You have communicated this plan, I believe, to all the vestries in the Southwark Company?—I have done so, but it has not been adopted in any instance.

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1492. But did they approve of it?—They approved of it, and thought it was a very excellent plan, but there was no one that would find the money for it.

1493. You mentioned the expense, I think; how much would it be?—About 7 *l.* or 8 *l.*

1494. The Southwark Water Company gives a Sunday supply, I think, to a large portion of that district?—They do to a very large proportion.

1495. You would give it wherever it was asked for?—We would give it wherever it was asked for.

1496. Have any complaints been made under the 9th section of the Act of 1852?—There have been two complaints from the parish of Bermondsey. After some very heavy floods, the water became a little discoloured, and Captain Tyler was appointed by the Board of Trade to examine into the cause of it, and after visiting the district, and also the works, he suggested that some addition should be made to the company's filtering beds, and that was immediately carried out, and since then there has not been any complaint.

1497. You made those additional filter beds, and that remedied that defect?—That remedied the defect.

1498. But I believe Captain Tyler condemned the fittings in the houses, did he not?—He inspected several of the houses, and he condemned the whole of them, and said they were so bad, that he was not at all surprised at an occasional deficiency of water.

1499. Including the fittings in some of the houses of the memorialists themselves?—Yes.

1500. *Chairman.*] Have you the report of Captain Tyler?—I have not, but the Committee will have Captain Tyler before them.

1501. Will you furnish a copy of the report?—I will do so.

1502. Mr. *Clay.*] Has any memorial been presented to the Board of Trade from the inhabitants of Peckham?—Yes; from the inhabitants in the higher portion of Peckham. There the inhabitants could not get a proper supply in consequence of the great waste in the lower part of Peckham, and Captain Tyler recommended the company to put down an additional or special main for that district, which was done, and since then the inhabitants have been properly supplied.

1503. Has any penalty been laid on this company under the 16th section of the Act?—No.

1504. Has any prosecution been taken against the company under the 20th section?—No.

1505. As to the Grand Junction Waterworks Company, do you confirm the statement made by that Company in the returns to the Committee?—I do.

1506. And before the passing of the Metropolitan Water Supply Act of 1852, the Grand Junction Waterworks Company obtained their supply from the Thames at Kew Bridge, did they not?—They did.

1507. Kew, I believe, is a sort of distribution for the company's entire district?—It is.

1508. But the water destined for the highest part is received elsewhere, is it not?—It is pumped from Kew into a reservoir on Camden Hill, Kensington, and then repumped to a higher level for the houses on the north side of the Uxbridge Road.

1509. Have the companies acquired any additional land besides that occupied by their works at Hampton, and Kew, and Camden Hill?—They have; they have acquired land at Shootup Hill, in the upper part of the Edgware Road, for high level services when required.

1510. What height is that above Trinity high-water mark?—It is 266 feet above Trinity high-water mark.

1511. Has any demand for a constant supply been ever made on the company?—It has not.

1512. What is the cause of that, in your opinion?—I think the houses are so well provided with cisterns that they do not require it. The houses are of a very good class, and they have all the fittings and all the appliances necessary for storing water.

1513. Then you think that a change in the existing system of supply would not be acceptable to the inhabitants of the Grand Junction District?—I do not.

1514. You give a supply on Sunday, I believe, whenever it is asked for?—Whenever it is required.

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1515. Has any complaint been made to the Board of Trade as to the quantity or quality of the water supplied by the company?—No.

1516. Has any penalty been inflicted on the company under the 16th section of the Metropolitan Water Act?—No.

1517. Has any prosecution been taken against the company under the 20th section of that Act?—None.

1518. As to the general case, I believe you confirm Mr. Simpson's evidence as to the flow of water in the Thames being more than ample to supply the Water Companies for many years to come?—I do.

1519. I believe, both the Southwark and Vauxhall Water Company and the Grand Junction Water Company very readily acquiesced in that arrangement, under the Thames Navigation Act of last year, by which they were to pay 1,000 *l.* a year each, in common with the other Thames companies taking their supply from the Thames?—They did very readily.

1520. What benefit do you think they will derive from the Act passing?—The Thames will become purer from being better looked after, and drainage will be prohibited from passing into it, and no doubt the water will become purer.

1521. And every year it will become still purer?—Yes.

1522. Do you consider that the operation of that Act will add to the capacity of the river, as a source of supply?—I think it will.

1523. I believe you would confirm Mr. Simpson's evidence as to the cost of making a change from the intermittent to the constant system of supply?—I believe the estimate was rather under the amount than over it; I think it would exceed the amount named by Mr. Simpson; he took an average of 8 *l.* per house, but I think it would be nearer 10 *l.* per house.

1524. Do you think that such a change from the intermittent system of supply to the constant system of supply, would necessitate the abolition of the present fire plugs?—It would; it would be necessary to put hydrants with proper stopcocks to prevent the plugs going out of the mains.

1525. And what do you think would be the cost of those hydrants?—In the Southwark and Vauxhall district there are between 9,000 and 10,000 ordinary plugs, which probably might be reduced to 9,000, and taking them at 10 *l.* a piece, that would be 90,000 *l.*, and in the Grand Junction district there are about 6,000; that would be 150,000 *l.* altogether.

1526. Mr. *Benyon.*] What are the present plugs?—The ordinary wooden plugs.

1527. The same as the other Water Companies have?—The same as the other Water Companies have.

1528. Mr. *Clay.*] Do you think that a strict system of supervision would be requisite to carry out the constant supply?—I do, or else the waste would be so great in the lower parts of the district that the upper parts would never receive any water at all.

1529. Do you think that would answer in London?—I do not think it would; it might be made a matter of necessity.

1530. Mr. *Denison.*] I have now the report which was asked for, and I may begin by putting this before you; the first letter that appears here is a letter from the Board of Trade, of the 26th December 1863, requesting the Vauxhall Company (as we call it for shortness) to do certain things; that is so, is it not?—Yes.

1531. Then the next document that appears here is the memorial that was presented; and then we have a longish report from Captain Tyler, the one which you referred to just now, in which he says, in substance, I think, "their filtering beds are not sufficient"?—Yes.

1532. Then with regard to specific complaints, this sort of summary may be given: in a certain district it was found that there was an insufficient supply of water, and the reason appeared to be that the main entering the yard had got flattened, I suppose, by mischief; was that so?—Yes.

1533. Then there was another comparatively minor complaint, that in two courts, which are mentioned, or, at least a court with a yard attached to it, there was only a supply on alternate days?—That was the representation; but the supply was given every day, including Sundays.

1534. Then another complaint was about insufficient supply, which did not receive much corroboration; but the houses had neither ball-cocks nor taps, and

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consequently all the surplus water beyond what was sufficient to fill the cistern must run to waste; the Sunday supply, he said, was given to the poorer districts?—Yes.

1535. Then I think the next thing was, that the house proprietors were very much to blame for not supplying the proper fittings; and that the company had no power to compel the householders to do it; and Captain Tyler then suggested a remedy for that in the Act, which provides, that subject to the provisions of the Special Act, every Water Company should be required to provide a constant supply of pure and wholesome water on the request of four-fifths of the owners or occupiers. Then he says, that is practically inoperative, because the four-fifths will not do it; and then he says it would not be desirable to give the Water Company power to do it, but that it might be desirable to afford the necessary power for this purpose to some independent Board.) Then he says, "There can be no doubt of the advantages of a constant supply, any more than of the difficulties in carrying out; these have in some cases been found to be insuperable, but the experiment is now being tried in Glasgow on a large scale, as well as in other places, and hitherto with success; but with or without, there ought, in my opinion, to be a suitable covered cistern or receptacle for the water, to contain a 48 hours' supply, in case of accident to a main from frost, or otherwise, in every house which depends upon a Water Company for its daily supply." Then there is one more official letter from Mr. Booth, and the thing winds up with the report of Captain Tyler, of which I think I need not read more than the last two or three passages. At the top of page 10 he says, "I find that two new filter beds are being constructed by the company, one of them affording an area of 75,000 feet, which will be in operation in a few days, and another of about the same size, which is expected to be completed in six weeks. The contractors have been working day and night, and on Sundays, to hasten their completion; and I see every reason to be satisfied that there will be no further cause for complaint as regards the quality of the water, as soon as they can be employed. In the meantime, the inhabitants have no doubt had good reason to be dissatisfied, and particularly when the river Thames has been flooded, as I have already fully explained in my report of the 16th December 1863. I find that the complainants were not at the time furnished with a copy of that report, and I would venture to suggest that a copy of it should now be forwarded to them. I need only add here, that the company are doing that which appears to be necessary to remedy the grievance which is now complained of." That is dated the 9th of April 1864; and has there been any further demand made upon you by the Board of Trade since that?—There has not.

1536. *Chairman.*] What would be the cost of a tank or cistern for each house as recommended in this report: "In my opinion, there ought to be a supply to every house in the district on every day, including Sundays; and there ought to be a tank or cistern in every house, to contain at least a 48 hours' supply?"—I think about 40 *s.* probably would do the whole.

1537. Including the ball-cock and the waste pipe?—Including the ball-cock and the waste pipe.

1538. Mr. *Denison.*] Could you get a cistern put up for 40 *s.*?—Merely the supplying of the cistern and the ball-cock, and the waste pipe from it.

1539. Including the putting it up?—It is assumed that there would be a place to put it on.

1540. And it assumes some work in doing it?—That would be in addition to the cost of the cistern.

1541. *Chairman.*] Do you mean that a communication pipe would have to be added, if there be no communication pipe at present?—Yes.

1542. And if there be no stand for the cistern, it would have to be added?—If there be no stand for the cistern, it would have to be added.

1543. What would be the cost of the communication pipe?—That might cost, possibly, 20 *s.* or 30 *s.* It would depend upon the distance from the main to the cistern.

1544. Then what would be the probable cost of setting up the cistern?—That might be 2*l.*, or 3*l.*, or 4 *l.*, or 5*l.* It is a matter of great uncertainty where the cistern could be placed.

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Cross-examined by Mr. *Cripps.*

1545. Has not some portion of your district been already supplied by constant system of supply?—A very small portion, I think. There was an experiment made as to 16 houses.

1546. Is that in St. Olave's?—It is in St. George's.

1547. Has there been any attempt to supply water on the constant supply system to St. Olave's?—No.

1548. That is the only instance in your district, is it?—The only instance.

1549. When was that tried?—Perhaps five or six years ago.

1550. Is that the only instance in which you have any experience of an attempt to supply on the constant system in your district?—Yes.

1551. How long was it in operation?—It was an experiment which I made myself on my own property.

1552. But how long was it in operation?—The second year after the pipes had been properly laid on they began to fail. The taps were all being destroyed or taken off the pipes, and it became such a nuisance, not only to the tenants, but to the adjoining property, that I was obliged to take the pipes away.

1553. And it was an experiment of your own on your own property, you being the water engineer of the company?—Yes.

1554. Then your opinion I suppose I may take it from that, upon the general question, would be in favour of the intermittent, and against the constant supply system, is that so?—Yes; where proper cisterns are provided I think that it is a very excellent system.

1555. Supposing that a proper system of supervision were introduced, what would be your opinion then?—I said proper cisterns, not a proper system.

1556. But whether it were a proper system, or a proper cistern, proper material, or anything you please, being supplied, then should you prefer the constant supply system as against the intermittent system?—I should not in a general way; it might be very good for poor districts where a pipe could be taken at once into the house.

1557. Then I may take it that, under any circumstances, whatever the machinery might be, your opinion is in favour of the intermittent system?—It is.

1558. And I believe that you are committed to that opinion by having already published your opinions upon that subject?—Yes.

1559. When did you publish those opinions; how long ago was it?—Five or six years back, but I cannot tell exactly when.

1560. And, as the engineer of the company, you would generally advise that the intermittent system was sufficient?—Yes.

1561. Is that influenced at all by the cost of the change, or is it a definite opinion quite independent of the cost of machinery, or the cost of change?—It is the cost of change more particularly.

1562. Assume, if you please, that the question of cost of change and fittings and machinery, were out of the question, and that everything were to be done, and that you had a new system to begin upon, would you still prefer the intermittent system to the constant system?—I think that the intermittent system has its advantages.

1563. That is not quite an answer to my question. Assuming the cost of the change to be out of the question, and assuming there to be proper fittings, would you still prefer the intermittent system to to the constant system?—I think that the intermittent system is certainly to be preferred.

1564. Under any circumstances, you would prefer the intermittent system?—Yes.

1565. Is the plan which you have been good enough to furnish us with here supposed to be upon the intermittent system?—The water would be kept constantly on with that system. It is merely a small cistern as an auxiliary, and the company would give the additional water without extra charge if any one would provide the cistern to take it.

1566. But if your main were constantly supplied, that proposed tank would be always full, would it not?—It would; but being under ground very little pressure would be required, and the stop-cocks would be regulated so as to allow a sufficient quantity of water to pass to keep it constantly filled.

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1567. Do you mean that that would be so far as it goes a constant supply?—I do.

1568. And that you would think an advantage to cottage property?—I think so.

1569. And do you think it an advantage that in some way or other a cottage should be constantly supplied with water?—In that way.

1570. It would be an advantage in whatever way it was done; I take it that you would consider it an advantage in itself that poor tenements should be supplied with water?—I think that would be a great advantage.

1571. You say that you confirm Mr. Simpson as to the question of the proposed change; what do you assume are the proposed changes; do you assume that there will still, with the proposed change, be a cistern or not?—A cistern.

1572. Then what would the change be if the cistern were to be there still; the cistern at present is provided with a ball-cock, is it not?—It is.

1573. So that whatever pressure there is upon the main, if the cistern was full, no more water could enter?—The pipes at the present moment are so badly laid and so weak, and the whole of the fittings are so bad, that they would not sustain any greater pressure than is now put upon them.

1574. You mean that at the present time they are defective?—They are defective, and they are too weak to bear any greater pressure.

1575. Then what you assume the change would be, would be from some defective state of machinery to some efficient state of machinery?—Making the change from the present defective fittings, to a perfect system.

1576. That is what you would take in as an element of the cost?—Yes.

1577. The present defective state and the proposed perfect state?—Yes.

1578. But, assuming that you had at present ball-cocks in operation, what then would be the great expense?—The whole of the lead pipeage would have to be renewed between the ball-cock and the company's main.

1579. Do you mean that the whole of that lead pipe is so weak that it could not stand the pressure?—Yes.

1580. How then how does it happen when you are giving an intermittent supply, when the cistern is full, and the ball-cock up?—Because the water is only turned on for a given time, and there are so many draughts from the main, that the pressure is just enough to fill the cistern, and no more.

1581. But the pressure at that time upon those pipes is just the same as, if not greater, than it would be with constant pressure, is it not?—If there were constant pressure it would be due to the head, whatever height the reservoir might be.

1582. But with the intermittent system, you must put on pressure to carry the water to the house at present, must you not?—That would be equal to about 15 or 20 feet above the level of the pavement.

1583. Then do you mean that it is merely a question of what height the constant supply must be?—The constant supply must be high enough to supply the water to the highest house, in an undulating district; and that would throw the pressure upon the main of perhaps 150 feet.

1584. Then I understand you that the increased pressure is not so much the mere increase to the constant supply from an intermittent supply, but because you assume that it must be supplied to a higher level than the house?—No; the whole of the district being on undulating ground, the variation of the pressure from the low part to the higher, would be perhaps the difference between 50 feet and 100 feet.

1585. But to fill existing cisterns, that pressure must be put on at the time that those cisterns ought to be filled, must it not?—The pressure is put on to a number of small mains or service pipes in connection with the company's main, sufficiently long to charge the cisterns at the height at which they are placed. Then as soon as they are filled, the cock is turned off, and there is an end of the pressure.

1586. But you do not mean to tell me that the pressure is turned off the moment a cistern is filled?—The fittings are in that defective state that there are always a great number running to waste.

1587. I want to get, if I can, the difference between the effect upon those lead pipes of a constant pressure and of an intermittent pressure. Is it not the case that while the intermittent pressure is on, the effect upon those pipes will be the same

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same as it would be only for a longer time if the constant pressure was on?—Certainly not. If the waste is prevented under the constant supply system, the water will be penned back to the height due to the head that it comes from, and that may be 150 feet above the level of the street; whereas now the water is turned on, and the height is never more than 20 or 30 feet above the level of the street.

1588. Then what you object to is the great height that you would have to send it to by the constant pressure system?—No; that is not so.

1589. *Chairman.*] The water in the pipes would be subject to the pressure of the head of water in the service of the company?—Yes; which might be 200 feet.

1590. And that water would be brought to bear upon the communication pipe?—Yes.

1591. Whereas under the present system that water is not brought to bear upon the communication pipe, but a less head of 25 or 30 feet?—Yes.

1592. Mr. *Cripps.*] But under the present system is not that brought to bear upon the communication pipe?—No; it is only due to the height of the delivery to the cisterns.

1593. You told us that people would object so much to the system of supervision. Have you had any experience at all of that?—We know that when we send our inspectors round occasionally, people have a great objection to admit them.

1594. But you have no experience of the system of supervision which must be going on more or less, if the constant supply system is adopted?—The supervision would have to be much extended if the constant system were adopted, because we have now only the power of making the inspection between nine in the morning and four in the afternoon, and a great quantity would be wasted in the night.

1595. Have you any experience anywhere of the supervision under a constant supply system?—No; but I imagine that that would be the case.

1596. Are there any houses in your district which are not supplied at all with water?—Very few.

1597. But there are some, are there not?—There are some, I have no doubt, in the outlying districts, which are provided with wells and rain-water tanks.

1598. And they rely upon them, do they?—They do; there are some in the country districts.

1599. Do you take all your water from the Thames above Tedding, or is some taken still from Battersea?—The whole of it is taken above Teddington.

1600. How long has that been the case?—Since the works were formed there in 1855.

1601. Has no water been taken at all from Battersea since that time?—No; on one occasion, perhaps I had better mention that, the iron conduit between Hampton and Battersea had broken, and it took 36 hours to repair it, and I had a little water let in at Battersea into one of the reservoirs in case of fire.

1602. I think you told us that you had had no application at all under Section 15?—None in compliance with the terms of the clause.

1603. Have you ever had any complaints made to you from the General Purposes Committee of the St. Olave's Board of Works?—We have not had any special complaints; we had an application once for a constant supply by some of the parish authorities, but when they understood that it would cost something to alter the fittings in the district, they at once gave up the idea.

1604. Was that an application under the terms of the 15th section?—No.

1605. Was it merely an application from the Board?—It was merely an application from the Board; they fancied, then, that constant supply meant constant waste; that is to say, that they had nothing to do but to leave the main open and let the water run from one year's end to the other.

1606. I suppose that was your interpretation of it?—No; they did not want to spend anything to alter the fittings, but merely for the company to leave the water on, and let it run constantly.

1607. And you objected that the fittings were not in a state to maintain that, I suppose?—We did.

1608. Have they ever applied to you with reference to courts and places which you supply with water, and represented to you that the supply was insufficent?

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ficient?—They have done so; but when a report has been sent in of the state of the fittings, they have not taken any action in it. It was a question, then, of one pipe supplying three or four houses.

1609. How many times do you think you have had representations from the General Committee of the St. Olave's Board?—Not very many.

1610. About how many?—Perhaps half a dozen.

1611. Now, what has been done upon those complaints?—A report has been made of the state of the fittings in the district.

1612. And was the state of the fittings found to be bad?—It was, in every instance, and that was the cause of the deficiency, and the cause of the complaint being made. Then a representation was made to the landlords, or to the owners of property, that they ought to put their pipes in a proper state of repair, and have proper cisterns; and in some cases it was done, but in other cases it was not done.

1613. Then in some cases those complaints could not be cured?—They were not cured.

1614. Do you attribute that to the want of sufficient power, in compelling the landlords to put the works in proper order?—I think the landlords ought to be compelled to put all those matters in proper order.

1615. And you have found that the insufficient supply existed, and went on in consequence of the want of sufficient power of that kind?—In consequence of the fittings not being put in proper order.

1616. And for the want of some sufficient power to compel them to be put in proper order?—Yes; no doubt.

1617. *Chairman.*] Did you hear the evidence of Mr. Simpson throughout?—I did.

1618. Do you concur in his views as to the general character of the valley of the Thames, and the quantity of water that it is capable of supplying through the Thames at Hampton?—I do.

1619. Do you also concur in his views as to the possibility of constructing reservoirs for the storage of water, if necessary?—If necessary, I do; I think there is every facility for so doing.

1620. Have you had your attention called to the great difference in the quantity supplied per house, to the houses in the districts, supplied by the two companies with which you are connected?—I have.

1621. Did you observe that in the one case 9,317,000 gallons daily is supplied to 26,900 houses and 242,000 inhabitants, and that in the other case it is only 12,500,000 gallons to 73,900 houses and 468,000 inhabitants?—The principal reason is, that in the Grand Junction district the houses are of a very high class, and they have every convenience for consuming water, such as large boilers at the back of their kitchen-ranges, several water-closets, and, in many houses, two, three, and four baths; they have also in that district a vast amount of road watering, and two large railway stations, and so on.

1622. You would have to correct the daily supply first by the special supplies which are not house supplies; but, after that correction, there is still a very much larger amount of house supply in one district than in the other, is there not?—I think it reduces the 39 gallons per head to 26½ gallons.

1623. That is in the higher districts of the Grand Junction Company?—In the higher districts of the Grand Junction Company; in the Southwark districts the poor people waste a great deal of water, but they certainly do not use so much for the purposes of baths and boilers, and things of that kind, which makes a great difference in the consumption.

1624. After making the requisite deductions, what is the amount per head supplied in Southwark or Vauxhall?—Just over 20 gallons. The higher quantity is 27 gallons; and, after deducting the special supplies, it brings it down to about 20 gallons as nearly as possible.

1625. And do you consider that a great deal of that is wasted then instead of being used?—A vast quantity of it.

1626. To what do you attribute the waste?—To the defective fittings and facilities of passing the water through the waste pipes into the drains for flushing.

1627. Have you any idea of the number of houses which are now inhabited by more than one family, and which are insufficiently supplied?—I have not.

1628. Can you form any estimate of those in the Southwark and Vauxhall districts?

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districts?—The number of houses below 20 *l.* a year, I think, is something like 40,000; and in a vast number of them the fittings are in a very defective state.

1629. But are there many houses which are without appliances to obtain a sufficient water supply?—The great deficiency is in the cisternage; they have perhaps a small barrel or pail, or even a pan, and sometimes they have no cisternage whatever.

1630. Is that chiefly applicable to the small houses, or is it also applicable to houses of a larger rental that are let out in apartments?—It does not apply in that way; it applies to the smaller class of houses, houses of two, three, or four rooms, letting at probably from 3 *s.* to 5 *s.* a week; but the six roomed and eight roomed houses are better off; they either have a good size water butt, or a cistern of some kind over the closet.

1631. Are there many houses in the Southwark and Vauxhall districts, having ten rooms or eight rooms, that are let out in apartments?—There are in some of the poorer parts of the districts; but not, I think, to any great extent.

1632. Are those houses furnished with additional cisternage for the larger number of people in them?—They, most of them, have two or three large water butts in cases of that kind, in addition to the ordinary cistern over the closet.

1633. In connection with the ordinary cistern?—In connection with the ordinary cistern.

1634. Do you consider that, in those houses, generally, there is a sufficient supply of water for all the number of inmates in them?—I think there is. In property of that kind which is let as lodging houses, they seem to take more care for the proper supply of water than generally is taken in other cases.

1635. What do you propose to have done in order to insure in the small houses a sufficient supply of water?—I should prefer to see a proper cistern over the closet, or in some convenient place where it could be fixed.

1636. Your own view is that the landlord of those houses should be compelled to put up a cistern?—If that was done, there would be an end to all complaint.

1637. But do you see insuperable difficulties to there being a mere pipe and tap introduced into the house, with a constant supply?—I think there would be the greatest difficulty; the flushing of the closets and things of that kind now are managed from a cistern, and I do not know how that is to be accomplished, unless they have some means of storing a given quantity of water by some means.

1638. Have you had your attention directed to the system which has been adopted in the east end of London, of regulating the constant supply by the introduction of an intermediate regulating pipe?—I have seen the small ferrule which has been introduced into the main.

1639. What is your opinion upon that system?—As far as it goes it is very good; it prevents waste and accomplishes a certain object; that is, that the water is constantly on, but the quantity is limited; they can only have a certain quantity delivered in the 24 hours, whereas with the intermittent supply, if they required double or treble the quantity, they could have it.

1640. But that also requires the introduction of a cistern, does it not?—That requires the introduction of a cistern.

1641. Would there be any difficulty in your using that system?—The difficulty in the Southwark district would be in keeping the water on at the various levels, and in that district it would involve an expense of something like 300,000 *l.* or 400,000 *l.*

1642. Is there no mechanical means by which you could separate the service so as to have it under different mains?—Not without laying down separate mains, or putting up a high level reservoir.

1643. Or a low level reservoir?—Or a low level reservoir.

1644. Would this reservoir be very expensive?—It is not so much the expense of the reservoir as of the district mains.

1645. But if you introduced intermediate regulating reservoirs it would answer the purpose without any new mains, would it not?—No, it would involve an alteration of the whole of our system of supply; at the present time the variation of the levels in the Soutwark district is from two or three feet above Trinity high-water mark, to 160 feet above Trinity high-water mark.

1646. But would it be necessary to make any greater distinction than 50 feet, for example, from level to level, to avoid all that disruption of pipe of which you have spoken?—I think that it would be necessary, perhaps, not to go beyond 25 or 30 feet.

1647. Do you think that you could easily find a contour line of 25 feet through your district, and adopt pipes to it?—It could be done, but it would be a very expensive operation.

1648. Could it not be done without laying new pipes?—Certainly not. The water now is brought from one fixed point, that is Battersea, and it all passes into the district, and the various mains are all under that pressure; and shutting off certain sections of the district from hour to hour in the course of the day, enables the water, after the low districts are supplied, to be pressed forward into the upper districts; but if the low districts are left, then there would not be any water at all, and in fact the low districts would not receive any water at any time.

1649. Might not that arrangement be adopted provided that you could connect the existing mains with the intermediate reservoir?—Yes.

1650. Would that be impossible?—It would be impossible to find sites for the reservoirs.

1651. The cost of the six regulating reservoirs, it would now seem, would not amount to the number of hundreds of thousands of pounds which you have mentioned, would it?—It is not so much the construction of the reservoirs, but the mains would have to be laid from them, or to them.

1652. The question is, whether the mains are so laid that they could be connected with each reservoir?—They could not be without a vast expense; it would be impossible.

1653. Mr. *Kekewich.*] Of what material are the cisterns in the poorer houses generally constructed?—Some of them are of slate, others are wooden cases, lined with zinc, and many of them merely the commonest class of butt or tub; butter tubs, and all sorts of things.

1654. Are the deal cases lined with zinc permanent; do they last?—They last a considerable time, but not so long as the slate or stone cisterns.

1655. The slate is a much more expensive article, is it not?—It is.

1656. What quantity of gallons do you recommend that the cistern should contain?—120 gallons is about it.

1657. For one house?—For one house.

1658. Was it not stated by one of the witnesses that a 40 gallon cistern would be sufficient?—120 gallons is 20 gallons a day for six people as an average.

1659. What is generally the size of the cisterns; how much do the cisterns of the poorer houses generally hold?—They generally, in cases where they are put up in the first instance, contain from 80 to 150 gallons, but they vary in size.

1660. Do you think a cistern with a ball-cock and a waste pipe could be supplied for 40 *s.*

1661. Independently of the communication pipe and the stand for the cistern?—Yes.

1662. Mr. *Benyon.*] You stated that the expense of changing from the intermittent to the constant system was as great as Mr. Simpson mentioned, but that that expense was due mainly to the present defective state of the pipes, which would not do for the constant supply?—Yes.

1663. But the present state of those pipes is sufficiently good for the intermittent supply, though not for the constant supply, is that your meaning?—That is so.

1664. That is to say that you mean that it would be defective as regards constant supply, but that it is not defective as regards intermittent supply?—Yes.

1665. And the two and a half millions of money would be incurred in rendering that effective for constant supply, which is not ineffective for intermittent supply?—Quite so; it would be in making the change from one system to the other.

1666. That is to say, there is no considerable expense necessary to render it effective for intermittent supply, but a very great expense would be necessary to render it effective for constant supply?—Just so.

1667. Lord *Frederick Cavendish.*] I understood you to state in answer to the honourable Chairman, that in every house there ought to be a proper cistern over the closet, was that so?—In any convenient place.

1668. Do you agree with Mr. Simpson, that for every house there ought to be two cisterns?—I think it would be a very good thing if it could be so arranged.

1669. Do you consider it of great importance or not?—I think that it is of importance.

1670. *Chairman.*] Have you considered the plan of having a regulating chamber over the water-closet, so as to prevent any waste of water?—I have not considered that.

1671. Do you know whether any investigation has been made between the difference in the quality of the water, as supplied by the companies, and the quality of the water as drawn from the cistern in the poorer parts of the metropolis?—It has been done in some instances, but I do not know the result.

1672. Do you know how far the complaints arise from the quality of the water drawn from the cistern differing a good deal from that which is supplied by the company?—I think that whenever there is a complaint as to quality, it arises in that way, because the Registrar General's monthly returns show that the water, as drawn from the main direct, is generally very good; but that where it is taken from a foul cistern it is not so good.

1673. Have you made any observations sufficiently general to be able to say what is the conduct of the inhabitants in keeping their cisterns clean?—They are very neglectful generally speaking.

1674. Then would it be one advantage of any system of constant supply that it would obviate that source of impurity?—There is no doubt that if they could draw the water direct, it might be an advantage so far.

1675. Would it be necessary to give any very large supply if the water drawn direct were only drawn for consumption?—The water drawn for consumption would be of a very limited character in most houses; perhaps only two or three gallons a day, or something of that kind per head.

1676. Then would there be any great chance of waste if there were a very limited direct supply for the purposes of consumption?—It depends upon where the outlet of the tap was placed; if it was over a sink, it might be left to run from morning to night. There is no control in that at present.

1677. Do you think that it would be impossible to control the tap if it is introduced into the house, sufficiently to prevent its being over a sink?—If it is so placed as to allow the water to run to waste, it will be let run to waste in many instances.

1678. Lord *Frederick Cavendish.*] Have you considered the possibility of measuring the quantity of water supply to a house?—It is attended with great difficulty; I do not know any meter which would act.

1679. If you have had reason to believe that great waste was going on in any one house, is there no means of measurement which you could adopt to check it?—A meter might be put on, but whether it would act or not I cannot say.

1680. *Chairman.*] On reflection, what do you think would be about the cost of an intermediate regulating reservoir or cistern between your services or pipes; do you think that it would cost 5,000 *l.*?—The reservoir itself might not cost very much, but it is the contour mains which would be required.

1681. The regulating reservoir would be comparatively a small expense, would it not?—I do not know how it is to be applied; the trunk mains of the company pass direct from their works at Battersea through the lower portons of that district.

1682. You have seen an aqueduct probably in your lifetime?—I have.

1683. And you know, therefore, that where you have to deal with varying levels, with an aqueduct, the ordinary practice is to introduce a regulating chamber, which is a very small affair, though the aqueduct may be a very large one?—Yes; but in a system of water supply such as we have south of the Thames, the whole of the water is conducted to the lower part of the district, and thence it is conducted by some 400 or 500 miles of distributing pipes, all radiating as it were from the bottom of a basin to the rim, and to divide that it would be necessary to cut off the lower portion.

1684. That is to say, to cut off the pipes for every contour of 25 feet, according to your view?—Yes.

1685. Is that a work of great difficulty?—It would be a great expense to take up all the different mains above that level.

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1686. Would you have to take up any mains, or is it only a question of cutting them up?—We should have to connect them.

1687. Are they not capable of connection and disconnection by the thousands of turncocks that shut off the different pipes?—That is the principle upon which they work now, beginning at the lower level and working up gradually to the higher level.

1688. Then if you have a system by which you can bring all the pipes into action at the contour, it would seem that you could bring all the pipes to act, and so regulate that system?—I think that it would be impossible.

1689. But it is the fact that you do supply now upon every contour of 25 feet?—By shutting off the supply in the lower parts; but during that time the pressure is going on to the third, fourth, and fifth.

1690. But it would seem that you have the power of delivering the water now at different levels over the whole of the system?—Yes; by shutting off the lower part.

1691. Then you can shut off the pipes at each different level now?—Yes.

1692. Then if you can do it daily whenever you require it, you can do it permanently by not opening them?—Then the waste from the lower part would be so great that it would be an impossibility to get the water to the upper part.

1693. Probably if you found an Act of Parliament ordering you to supply that, your ingenuity would be able to surmount the difficulties?—I think that it would be attended with enormous expense to do anything of that kind; because the vast number of pipes on the lower level must be shut up before the water will rise to the upper level.

1694. But if you have already the power of shutting off and isolating every level of 25 feet at the present time, where is the difficulty of applying to the system which already exists, a regulating system?—It is exactly in this way: the main passes from the lower level of the district to the upper level, and the branch mains radiate from that main at all sorts of levels; and if the lower part were not shut off, there would be no water pass into the upper part; and to take up this portion (*describing the same*), it would be necessary to bring a main to join that; so that every 25 feet it would be necessary to have a proper system of mains to join on to that, and that would entail an expenditure of between 300,000 *l.* and 400,000 *l.*

1695. What is the whole capital of the company?—1,340,000 *l.*

1696. Colonel *Hogg.*] Would altering the fittings of the houses for the constant supply be expensive also?—Yes.

1697. How much would that cost?—It would cost, for the whole of London, about 3,000,000 *l.* I perfectly agree with Mr. Simpson there, but he is rather within the mark than not.

1698. *Chairman.*] According to your estimate, it would be cheaper for you to alter your system, than for all the houses to alter their pipes?—I think that the expenditure by all the companies would be about equal to the cost of the alterations in the houses.

1699. There are 73,000 houses in your district, and at 10 *l.* a house that would be nearly 600,000 *l.*, would it not?—That would be, at 8 *l.* a house, 584,000 *l.*

1700. And you think it would require an expense of 400,000 *l.* to alter your works?—Yes.

[The Witness withdrew.

Mr. *William Boughton Hack*, called in; and Examined by Mr. *Burke.*

Mr. *W. B. Hack.*

1701. You are the Engineer to the West Middlesex Water Company, are you not?—I am.

1702. And you have filled that office for several years?—I have.

1703. Before 1852 where did your company take their water from?—From Barnes.

1704. And in 1852 you came under the obligation, the same as the other companies, to remove your works above Teddington Lock, did you?—We did.

1705. I believe that previous to the removal of 1852 you had taken great care, at your works at Barnes, to provide pure water for the inhabitants of London, had you not?—Very great care.

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1706. And in 1852 I was your Counsel; and, if I recollect rightly, you produced various samples of water, and evidence, to show that the water which you supplied was very pure?—It was as pure as it could be without filtration; we did not filter then.

1707. Subsequently to the Act of 1852 you have complied with all the obligations of that Act in the removal of your works?—Yes; we did so, and constructed filters and covered reservoirs, and we took the supply above the town of Hampton.

1708. What is the total cost which the company has incurred in complying with those provisions of the Act of 1852?—Nearly 300,000 *l.*

1709. You now filter your water, and you send it through covered mains and pipes to your distribution reservoirs?—We do.

1710. Where are they situate?—We have one covered reservoir at Camden Hill, Kensington, which is 112 feet above Trinity high-water mark.

1711. The plan on the wall exhibits, does it not, the district which you supply?—It does.

1712. What quantity of water are you authorised to draw from the Thames?—Twenty million gallons per day of 24 hours.

1713. And what quantity do you actually require to draw?—Our greatest draught has been under 10,000,000 gallons; the average has been a little over 8,000,000 gallons.

1714.—And have you found that draught adequate for the supply of your district?—Quite so.

1715. So that in fact you have not yet approached the moiety of that which you are entitled to take for the supply of your district?—We have not.

1716. Have you estimated at all the number of gallons per head per day which you supply to the inhabitants of your district?—Upwards of 30 gallons per head per day.

1717. Your supply is, of course, like the others, at present, an intermittent supply?—It is.

1718. Have you had any complaints upon that subject?—Not one that I am aware of.

1719. Is your district occupied by gentry and middle class people, rather than by people of an inferior class?—It is so, and much the larger ratio would be the better class of houses.

1720. Those, I presume, are all adequately supplied with proper cisterns and fittings?—They are.

1721. And you distinctly state that since 1852 there have been no complaints whatever of insufficient supply, or of the supply being intermittent?—None at all.

1722. Then have you from that, very good reason to believe that your consumers in that district are satisfied with the supply which you now afford them?—I think that they are quite satisfied.

1723. Has any requisition been made to you for substituting a constant supply for an intermittent supply?—Not one.

1724. Have you given your attention at all to the subject of the expense which would be requisite for adapting the present fittings to a constant supply?—It must be an estimate; it might be 7 *l.* or 8 *l.* per house on the average.

1725. In your district, what would be the total amount on a rough calculation?—Between 200,000 *l.* and 300,000 *l.*

1726. Looking at the fact that you have had no complaints, and that, in your judgment, the parties are already satisfied with the present supply, do you think that a compulsory outlay of 200,000*l.* or 300,000 *l.* would be viewed with favour by your consumers in order to get constant supply?—I do not think that they would ever ask for such a thing.

1727. If they are satisfied with their present supply, do you believe that to get a constant supply they would be willing to incur that expenditure?—I am sure that they would not.

1728. Supposing that you gave a constant supply, would it necessitate, on your part, a much more constant supervision?—A very great deal more; for a constant supply the supervision required would be very great; we should want a complete staff of officers to be always on the alert.

1729. That would of course impose an additional expenditure on the company?—No doubt about it.

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1730. Do you believe that that constant surveillance over, and intrusion into, the houses of your consumers, would be viewed with favour by the consumers?—I think not at all; there is a good deal of difficulty now in getting an entrance into the houses; they do not like your coming in; they say that you dirt the house, and that you must take your boots off; they talk in that way; and sometimes they make you put slippers on before you go up-stairs to the upper cisterns.

1731. But now have you experimentally tried giving a constant supply in one or two instances, in order to test the amount of consumption?—Yes; in two cases; one on low ground at Hammersmith, and one on higher ground, about 80 feet above.

1732. In comparison with the intermittent supply, which you say is sufficient, what was the amount of water consumed where you gave the constant supply?—Nearly 14 times as much on the low levels at Hammersmith, and nearly six times as much at the higher levels: of course the pressure being less, the waste was less.

1733. Therefore, if the intermittent supply was sufficient, those 13 times in excess must have been principally waste?—Yes; and with the present arrangement of pipes, I do not think all the five London companies could supply our district at that rate.

1734. The greater waste would take place, I suppose, where the water was at the lowest level?—Yes; at Hammersmith.

1735. What is the average flow of water where you take your water supply at Hampton?—I have made attempts to get it, but it is a very difficult thing; I can only judge from having known Teddington Lock for about 40 years, and I do not see any difference now from what there was 40 years ago.

1736. No doubt you cannot give it to us to a gallon, but can you give an approximate estimate of what you believe the flow to be?—In the dryest weather I should think there would be something very like 600,000,000 gallons of water passing our works in the 24 hours.

1737. Then, in your judgment, is there a very sufficient quantity of water in the Thames to supply London for many years to come with water?—No doubt.

1738. You have stated now that you do not use one-half the amount of water which you are allowed to take from the Thames?—We do not.

1739. Therefore you are in a condition to supply double the population which you now supply, if you take your maximum?—That is what I mean.

1740. Do you believe that that would apply to all the other companies taking water from the Thames?—I do.

1741. When you speak of 600,000,000 gallons per day, is that after the companies have taken their supply, or before?—That would be probably before. That would be passing over the Sunbury Weir and past our works.

1742. Your company, I suppose, has come under the same obligation as the other companies, to pay 1,000 *l.* a year towards the purification of the Thames, under the late Act of Parliament?—They do.

1743. And therefore you have endeavoured not only to comply with every provision of the Act of 1852, at a cost of 300,000 *l.*, but you have also come under a further obligation of 1,000 *l.* a year to give a better supply to the public?—Quite so.

Cross-examined by Mr. *Cripps.*

1744. When you say that no application has been made, you mean that nothing has been done under Section 15 of the Act of Parliament?—Nothing has been done.

1745. You say that your district comprises for the most part pretty good houses?—Very good houses.

1746. And where there generally would be sufficient room for the cisterns, and the cisterns generally are of a sufficient size?—Yes; and in those good houses there are proper and efficent cisterns.

1747. In houses of that character, whether there was a constant or an intermittent system of supply would make less difference, would it not, than it would to the poorer houses where those cisterns do not exist?—I really do not see the drift of your question.

1748. Supposing the cistern to be sufficiently large, and that to be filled, prac-

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tically, the parties in that house have, in one sense, constant supply, because their cistern is always filled?—Quite so.

1749. But you know that in the poorer classes of houses there is no room for cisterns of that kind, and they do not exist?—No; there is not room enough; they have butts in most places.

1750. And various contrivances to make up for want of cisterns?—Yes; in our district they are pretty well supplied, even in the poorer class of houses.

1751. Then it would result, would it not, that the constant supply would be much more wanted in those smaller classes of houses where cisterns do not exist than in the class of houses in your district, where large cisterns do exist?—No doubt about it.

1752. When you spoke of the expense of the alteration from one system to the other, you put it something like Mr. Simpson does, at from 7 *l.* to 8 *l.*?—Yes.

1753. Now, what is it which constitutes that expense of alteration; do you assume that you would have to alter the pipe down to the main?—Yes; to take everything away except the cisterns, because the present pipes would never stand the constant pressure.

1754. But in order to make up that 8 *l.*, you must assume that the whole system is to be altered down to the main in the street?—Yes; I should start in that way.

1755. You do not mean that it would cost that amount to alter the taps in the houses from the present system to what would be required in a constant supply, do you?—To entirely refit the house with new pipes, taps, and everything else.

1756. And that could only be done for something like 7*l.* or 8*l.*?—Just so.

1757. At the present time all those cisterns in the houses supplied by you, I suppose, are fitted with a ball-cock?—A great many have open pipes.

1758. And all are supposed to have ball-cocks?—They all ought to have.

1759. If they were in a proper condition to receive water according to the intermittent system as you supply them, they all would have ball-cocks, would they not?—If they complied with the company's regulations, they would all have ball-cocks.

1760. Do those ball-cocks stop the water when the cistern is once full?—If they are in good order they will do so.

1761. If they are in good order they stop the further flow of the water when the cistern is filled?—Quite so.

1762. Why should not that stop the further flow of the water if the constant pressure was on?—It would, no doubt, if it was kept on.

1763. If it was in a proper and efficient state?—Quite so.

1764. And it ought to be in a proper and efficient state even with the intermittent supply, ought it not?—It ought.

1765. Have you had any experience at all of the fouling of water in cisterns, or does that not come under your observation at all?—I had one instance of it some little time ago when the waste-pipe had connection from the cistern to the drains, and the cover kept the foul air in; but that is the only case which I ever knew of.

1766. But must it not be a danger always with a cistern if it is not properly attended to that the water is likely to become foul?—Not unless the drain pipes from the closet communicate in some way with the inside of the cistern.

1767. But is it not the case that there is always a sediment after some time at the bottom of the cistern?—Yes; no doubt; in our reservoir it is so.

1768. However pure the water in your reservoir may be, there will be some deposit, will there not?—No doubt.

1769. The persons in the superior class of houses of which you speak would take care to have their cisterns cleaned out from time to time, would they not?—They ought to do so, but I do not say that they do so.

1770. And if they do not, the water in the cistern will become more or less impure, will it not?—I do not know that that is really the fact, because the water itself is so free from sediment.

1771. But you told me that however pure it might be there would be some sediment in your cisterns?—There may be a little.

1772. Are the cisterns which are generally in use in that way perfectly covered, or are they very often imperfectly covered?—In the best houses they are well and properly covered.

1773. But as you get to a lower class of houses they are very imperfectly covered?—A great many have no covers at all.

1774. So that all the blacks and soot falls into them?—There may be a little from the house chimneys, but there is a Smoke Act, you know, to stop all the blacks.

1775. Are you fortunate enough to walk about London without knowing that blacks are always falling?—There are some, but I am not much in London myself.

1776. Of course you know that if a cistern is left open in London blacks and dust, and other impurities, will be always falling into it?—The blacks are carbon, and that might do it good you know.

1777. You do not seriously believe that, do you?—I am not a chemist, and I cannot suggest whether that is a good thing or not. Dust would not be a good thing to put into the cistern.

1778. But you will leave it an open question, whether the blacks would or would not be a good thing?—Yes, I will.

1779. In the cases where you tried the constant supply system, was any notice given to the parties beforehand that you were about to try the system there?—No.

1780. They did not know that any change was going to take place?—No.

1781. If constant supply were tried, you would assume at least that parties were to have notice of it, in order to make it an efficient test?—Yes; if it were carried out all over London.

1782. If the experiment was to be worth a farthing, you would put parties in the same position, would you not, as they would be if the matter was done really and effectively?—We might have done so, but we did not do so. We took things as we found them.

1783. In neither of the instances which you tried did you give any notice?—We put on a meter, and through the reading of the meter we found what was going on.

1784. *Chairman.*] Had you made any inspection on that occasion of the district which you were going to serve with constant supply?—The turncock went round to see how the thing was going on.

1785. But was there any special inspection of the houses before the constant supply, or after the experiment?—After the experiment was completed the turncock went round to see the state of things, and he found the fittings in a most dreadful state.

1786. He did not make the inspection before?—Yes; he had done so in that particular case. The houses had been inspected, and the ball-cock and everything put in order; and when he went round again after the constant supply was given, the balls were wrenched off the levers in many cases, and were floating about on the top of the water in the butts and tubs in the low part of the district; and the lever which was left on the plug of the cock was made a wrench or spanner to turn the plug of the cock always open; and it was found in that state.

1787. How long did you carry on that experiment?—In Hammersmith I think it was on for eight days, and in the other case it was found so bad that we stopped after two days.

1788. Mr. *Cripps.*] In neither case did you give any notice to the parties before?—We did not.

1789. You speak of the supervision which you think would be so very disagreeable; that must take place, must it not, and does take place, more or less, wherever constant supply has been adopted?—So I have understood, but I know very little about it.

1790. But I suppose you know enough about constant supply to know that it has been adopted in a great number of towns?—I have heard the evidence given here during the last few days.

1791. And whatever constant supervision may be necessary must be exercised, and, of course, has been exercised in those places?—Yes.

1792. So far as your company are concerned, assuming that the fittings were made properly, would there be any great difficulty in altering your supply from an intermittent to a constant system, with regard to your delivery?—I think that there would be, unless the pipes are very much reduced in size.

1793. I asked you that question, because I have a report from your company. "The company's works have been constructed to afford a practicable and efficient supply of water throughout their district on the intermittent system, and

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and they can also be adapted to the constant system"?—Yes, quite so; because we have service reservoirs, if it cannot be done by pumping.

1794. The company are not required by the Metropolis Water Act of 1852, to initiate the constant supply, and they have had no requisition, and have not done it?—Quite so.

1795. But if that requisition had been made to you, your works are so constructed that you could have supplied on the constant system?—Just so; provided the house fittings were in order.

1796. It is entirely a question of the fittings?—Yes; and some extension of mains. There are houses which have lately been built in South Kensington, and the upper part of the Bayswater-road, which the lower reservoir would not reach so as to keep a constant supply on, and the consequence would be that you must bring a main down to supply those pipes especially.

1797. Has there been a good deal of building going on in your district?—The whole district, or the greater part of the district, is filled up.

1798. In your northern district there is a good deal of building going on, is there not?—Not a great deal; they do not get on very rapidly.

1799. In new houses, and putting in the fittings for the first time, would there be any greater expense than if the constant supply had been adopted, in putting in fittings adapted to the constant supply than to the intermittent supply?—No; about the same, I think.

1800. I am assuming that there is no alteration, but then in building the house the landlord has to adapt it either to one purpose or another?—The pipes would have to be smaller; the weight would be the same, because the pipes would be thicker.

1801. And the difference would be in favour of the landlord if there was any, would it not?—It would be much about the same.

1802. Have you any houses in your district, which you know of, which are not supplied at all with water?—They may have been supplied, and the supply taken off. Parties may have moved, and the houses may be empty.

1803. I did not allude to where the water has been cut off, but, in a general way, are all your houses supplied?—There may be about 3,000 houses in our district which are not supplied at all, but we should be very happy to supply them if they asked us.

1804. How came there to be about 3,000 houses which are not supplied at all; do they not care about having water?—It is a suburban district, and they have wells, or they purchase water from the water carts, or obtain a supply from ponds.

Re-examined by Mr. *Burke.*

1805. In those suburban districts, I suppose, the parties have wells and tanks collecting their water, and are unwilling to pay a water rate, and prefer relying on their own supply?—Quite so.

1806. As regards the fittings for new houses, the new houses form a very small proportion of the number of houses in your district, do they not?—A very small proportion.

1807. The expense of the 300,000*l.*, which you referred to, would fall upon existing houses?—Quite so, taking the whole area.

1808. You did not give notice of this test of the constant supply system; did you consider that it was the fittest mode not to let any party know what you were going to do?—I think that that was the proper way to do it.

1809. Just to test from the existing fittings what would be the result of giving a constant supply, instead of an intermittent supply?—Yes; I think so.

1810. And with the existing fittings you find that this increase, to the extent of 13 times, existed?—Yes.

1811. Did that fortify you in your view, that you could not furnish that supply without a total alteration of the fittings?—You must have a total alteration of the fittings.

1812. And supposing those fittings got out of order hereafter, what power would the company have to compel their being reinstated in a good condition, so as to prevent waste; supposing the constant supply were given, which you say, with bad fittings would involve a waste to the extent of 13 times the existing supply; would the company have any power to compel the parties always to keep their fittings in perfect order?—I think not.

1813. If they had, must they not have a constant power of inspection, in order to be sure that that was the case?—They would require a constant inspection; it would be an everlasting thing, over and over again.

1814. In the better districts, you say there are always cisterns so large as to afford, practically, a constant supply?—Quite so.

1815. In those cases, then, they would not be better than under any other system of distribution?—They used our present system as a constant system.

1816. In poor districts, if you have any, what is your mode of supply; have you any poor districts?—Comparatively few.

1817. In those districts have they any cisterns at all?—They are chiefly butts; they have some cisterns, but they generally have butts standing in the area.

1818. That is entirely a question of the landlords; they might have large cisterns, I presume, if the landlords chose to put them?—Quite so.

1819. The cost of a cistern falls exclusively upon the landlord, does it not, and not upon the company?—On the landlord.

1820. And if he desires to have as good a supply as you say is always afforded, it is for him to supply the cistern?—Yes.

1821. And by the use of that cistern he gets, practically, a constant supply, does he not?—That is so.

1822, *Chairman.*] With reference to the answer you gave, that when your inspector examined the houses, he found all the cisterns and appliances in good order, it would seem in that case that the landlord had done what might be expected of him?—In the first instance, but after it had been on the constant system the notices were sent in to the landlords to put everything in order again.

1823. But when you inspected it a second time, it was not the landlords who had destroyed all the fittings, but the tenants, I suppose?—The tenants.

1824. Will you be good enough to tell the Committee what ought to be done to meet that state of things consistently with a constant supply, supposing that were made compulsory?—In the low neighbourhoods I do not see any plan that can be adopted, but something like Mr. Greaves's plan, that they shall not have the water to waste, but that it shall pass through a small orifice, so that the water on a constant supply shall be just enough to supply the poor houses.

1825. And you think that that is the best system with which you are acquainted for giving a constant supply with an intermediate cistern?—I think so. There would be a good deal of difficulty in our district, because it is a rising district. On a uniform level on a range of not more than 100 feet, it might be very well managed, but I doubt whether it could be done in the West Middlesex district, where there is a considerable range from nothing up to 160 or 170 feet.

1826. That would involve diminishing the area of the section of the measuring pipe in proportion to the increase of the head of water, would it not?—Yes; and to the size of the houses. It would be a difficult thing to arrive at, but it might be done.

1827. But having arrived at the head of water as delivered at the particular house, and the size of the house, and the number of inhabitants, there would be no difficulty, would there, in determining the size of the measuring pipe?—No; or it might be regulated by a stop-cock kept under lock and key, so that in a house which now probably had four or five tenants, and which afterwards had 10 or 12 tenants, by merely moving the cock, which would be locked up, and under the charge of the company, you might increase the size of the orifice and the supply of water.

1828. That would be the same result obtained by a different mode, would it not?—Quite so. To carry out the constant system in our district, the pipes must be very much reduced. We always recommend now for six roomed houses not less than a three-quarter inch pipe, with a view of getting the service done quickly in the course of an hour. Now to give a constant supply, and only to use the same pipe, would be impracticable, and we consider the pipe ought to be reduced to one twenty-fourth part of that.

1829. Have you applied your mind to the consideration of constant supply without an intermittent cistern?—I have not. I think that if that were carried out, and there were no waste pipes, that would be the most reasonable way to do it, Mr. W. B. Hack.

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it, because the pipes required would be so very small, and the taps would be small.

1830. Have you visited any of the places where there is that direct constant supply carried on at present?—I have not.

1831. Therefore you are not able to give any opinion from experience upon that subject, one way or the other?—I am not.

1832. Can you explain to the Committee how it happens that your company delivers only 8,200,000 gallons on an average daily to 36,000 houses, whilst the Chelsea Company delivers 8,000,000 gallons to 26,000 houses?—I can only account for it on the supposition that there may be more waste in the Chelsea district than in the West Middlesex district. If the West Middlesex tenants required more water, we should pump more water. That may be due to increased waste in the one company over the other.

1833. Then do you think that your company has arrived at considerable perfection in avoiding waste?—They have done a great deal in avoiding waste. We have no complaint of want of water, and, therefore, I think that the quantity which we supply appears to be quite enough.

1834. Then you ascribe the difference to the better arrangements to avoid waste?—Yes; and to proper supervision.

[The Witness withdrew.

Mr. *Johnson*, appearing for the Kent Water Company, stated that the Company had not associated itself with the other Water Companies, by reason of its deriving its water from totally different sources; and said that at the close of the case of the associated companies, he should be prepared to go into the case for the Kent Company.

Mr. *Toulmin Smith* made application for certain alterations to be made in a Paper issued by the Committee to the parties of points requiring explanation.

The *Committee* directed the alterations to be made.

After some discussion, this further procedure with the inquiry was adjourned until after the hearing of the East London Bill.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Monday, 3rd June 1867.

MEMBERS PRESENT:

Mr. Ayrton.
Mr. Henry Baillie.
Mr. Benyon.
Lord Frederick Cavendish.
Lord John Hay.
Mr. Headlam.
Mr. Kekewich.
Colonel Hogg.
Mr. Sclater-Booth.

ACTON SMEE AYRTON, Esq., in the Chair.

Mr. *Johnson* was heard to address the Committee on behalf of the East Kent Water Company. 3 June 1867.

Mr. *William Richard Morris*, called in; and Examined by Mr. *Johnson*.

Mr. *W. R. Morris.*

1835. I believe you are Engineer to the Kent Waterworks Company, and have been so for 32 years?—I have.

1836. I do not know whether you were behind me when I stated to the Honourable Members of this Committee the history of the origin and progress of the Kent Waterworks Company?—I was.

1837. Did I accurately state those facts?—As far as I had an opportunity of hearing them, they were correct.

1838. Your company at present supply solely, I believe, through the district which is tinted yellow upon that map?—We do.

1839. Mr. *Kekewich.*] Does the water of the Kent Waterworks Company come entirely out of the chalk?—Entirely.

1840. Mr. *Johnson.*] I think that up to 1851 your supply was solely, was it not, from the Ravensbourne river?—To a later period than that, up to 1856.

1841. In 1851, you know, there was a Government Commission sitting, composed of the three chemical gentlemen whose names I have mentioned, Professor Graham, Dr. Miller, and Professor Hofmann?—Yes.

1842. You probably are well acquainted with the report to which I referred?—Yes, I am.

1843. You say that subsequently to 1851 you still continued to use the Ravensbourne water?—We did.

1844. But I think the works were completed, were they not, between 1851 and 1856?—Our first search for chalk water began in 1856 and 1857.

1845. But the search for chalk water and the ultimate change of your source of supply was in consequence of the recommendation of the Commission, was it not?—That was one of the grounds.

Chairman.] We need only trouble the Witness for additional evidence as to the inexhaustible quantity of water from those pumping stations.

1846. Mr. *Johnson* (to the *Witness*).] Since when did you first begin to pump from wells?—We first began to use the chalk water in 1859.

1847. And can you tell me whether your experience has shown that that water is, in point of fact, what I described it to be, inexhaustible?—As far as my

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my experience has gone with regard to the wells already sunk, we have at present double the quantity which we require.

1848. Mr. *Baillie.*] What quantity do you raise?—At this present time we are raising 7,000,000 gallons per diem.

1849. *Chairman.*] Do you mean that the wells at present pumped from would produce double that quantity?—I have pumped the present wells at the rate of 14,000,000 gallons per diem.

1850. For how long?—In our case those wells are separate; they are seven or eight in number, situate at different points. The principal well is at Deptford; that well is sunk 100 feet, and bored 170 feet in addition, and the water rises to about two feet six inches above high-water mark.

1851. At what rate does it rise as an average; or first let me ask you, does it vary very much in its flow?—None at all.

1852. What is the average flow from that well?—When it gets to its maximum height of course the flow is insignificant, but to pump from one well at the rate of 5,000,000 gallons a day, it is necessary to lower that water from 70 to 80 feet.

1853. If you keep it at full stretch, so as to get a head of water of 70 or 80 feet upon the well, you can then pump it how much?—If we lower the well to 70 or 80 feet, we can pump 5,000,000 gallons per diem; if we stop pumping, the water instantly rises.

1854. Mr. *Kekewich.*] Do you never find it decrease in dry summer weather? —Not the slightest increase or decrease.

1855. *Chairman.*] What are you generally taking from that well now?—About 3,000,000 gallons a day.

1856. At what level?—From 40 to 50 feet below Trinity high-water mark.

1857. Will you give us the particulars of the next well?—The second well is in the same premises, and is situated about 250 yards from the first well. That well is not at all affected by the pumping of the other, and from that we raise about 1,250,000 gallons a day.

1858. Have you made any experiments as to the maximum of that well, when you are using the other at the same time?—I think that may be considered as the maximum, because that well is kept going day and night. The well is not so deep as the other, and I have no doubt we could derive double the supply, but in its present state I think that is the maximum supply.

1859. Do you mean that the well is not so deep, or the boring?—Neither the well nor the boring; the whole of the arrangements are not on the same scale as the other one.

1860. What is the next well?—The next is No. 3 Well on the premises again, situated a like distance from each other. We get from that well half a million or three-quarters of a million gallons of water per diem. That is a very small well; it is a trial well, in fact, and that may be considered as its maximum.

1861. What are the other wells?—We have also two wells at Charlton.

1862. Is the well at Charlton upon the upper level?—No, on the lower level. Those two wells are about equal in capacity. We use them very little; one well scarcely at all. We have a superabundant supply there, but we can get 3,000,000 gallons a day there.

1863. What is the depth of each well?—The depth of each well would be sunk 90 feet, and bored 150 feet more.

1864. What is the size of those wells?—In the largest well we began with a 16 feet shaft, and sunk down about 14 feet shaft to the level of 100 feet; then we bore an 18 inch bore hole, and in addition to that we drive galleries about 100 yards right and left at the bottom of the well.

1865. Are the galleries driven in the chalk?—Yes, driven in the solid chalk; the chalk is in all those cases at the surface of the ground at this point.

1866. Then you tap all the chalk to that distance?—Yes.

1867. You draw the water through that into the well?—Yes.

1868. What is the next well?—There is a well at Plumstead which is of a smaller character. That was not sunk by myself; it was formed by the Plumstead Company; it only yields about half a million gallons a day.

1869. That, I believe, is sunk at a lower level?—They are all situated on the upper level, but we have to go through some intermediate strata to get it from the

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the chalk, as in other cases. We have recently sunk a well at Bromley about three miles above, up the valley of the Ravensbourne. Our present supply there is very small; we are not using it above three hours a day, but we make scarcely any impression upon that well; we have not lowered it more than about 10 or 11 feet.

1870. What is the depth of that well?—That well is sunk about 95 feet.

1871. Has that well galleries also?—No; in this case we have an overlying bed of sand of 70 feet thick, and we merely pass through that and pierce the chalk; we then bore about 100 feet lower, and the water rises to the surface of the ground, and there the ground is about 70 feet above the level of the Thames.

1872. What are you pumping from that well?—We are pumping a very small quantity of water there, not above three or four hours a day; it is a new district; the water does not flow over the well, but it stands within about three feet above the surface of the soil,

1873. What is the next well?—There is a well now in progress at Crayford, we have tested it, but we have not tested it for supply; that well, I expect, will yield perhaps more water than any of the others.

1874. Is that well being sunk?—The well itself is completed, and the machinery will be complete in about a week for distributing from that well.

1875. What do you expect to get from that well?—We can get no more now than the machinery which we have placed there to raise the water will enable us to do, but I have no doubt I could get as much there as in any part of our district.

1876. That would be 5,000,000 gallons?—Yes, perhaps more; I dare say I could get 10,000,000 gallons there.

1877. Is there a well at Shooter's Hill?—No, we have no well there; that is merely an engine-house, with a second lift.

1878. To pump the water up again to a higher level?—Yes.

1879. Where does the water come from to that reservoir?—From Deptford.

1880. Are those all your sources of supply?—Those are all the present sources of supply.

1881. What is the maximum that you can get from all those wells?—I can pump those wells from actual pumping to 14,000,000 gallons a day.

1882. Mr. *Johnson.*] I understand you to say that you have no doubt you could double that quantity even with your present engine power, if necessary?—No; it is 7,000,000 now, and it could be doubled to 14,000,000.

1883. As regards a constant supply, have you made every arrangement to comply with the provisions of the Metropolis Water Act?—We have made every arrangement upon our part to give effect to that Act.

1884. With regard to the amount of your expenditure, was I right in stating that since you have relinquished the Ravensbourne, your Company have expended as much as 198,000 *l.* in the adaptation of their works?—Yes, that is the amount expended upon the extension of our works.

1885. As regards the Government establishments at Woolwich, the naval and military establishments, to which I referred in my opening, are those now on the system of constant supply?—Yes.

1886. That is not for domestic supply, is it?—That is for general supply, for all purposes.

1887. Do you mean that all of those establishments are at this present time served under the constant service system?—They all take their supply by meter under constant pressure.

1888. Your levels vary materially, do they not?—Yes, very much.

1889. From below Trinity high water to 440 feet above it?—Yes.

1890. And I think I am right in saying that under the Act of 1852 you are under no obligation to supply water above 180 feet above Trinity high water?—Yes, that is so; that is the level of the Woolwich Common reservoir.

1891. Are you aware of the provisions of that Act with regard to the question of constant supply?—Yes.

1892. With a view to that, have you ever made experiments to test how far it would be practicable, and if so, will you be kind enough to tell us the instances of those experiments, and the result of them?—The object of making the experiment was, what the worst would be if the public were to be at liberty to waste any quantity of water that they chose; and for that purpose I placed, in 1857, the town of Woolwich, for six weeks, under the constant service, giving them an unlimited

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unlimited supply, to see what they would do; it added to the company's consumption 1,000,000 per diem, which, spread over the houses supplied in Woolwich, would give them 148 gallons per head per diem.

1893. I have got it at 500 gallons per house?—The exact figure is this, they take 100 gallons per head, which is 700 gallons per house; and the difference would arise in this way, the figures that you have given are the maximum; I take the whole supply, and yours would be the additional supply.

1894. Colonel *Hogg.*] Did they know that they were going on the constant supply system?—No.

1895. Mr. *Johnson.*] It was without giving any notice; how long was it considered to be furnished?—For six weeks.

1896. Did you subsequently make an experiment upon a small block of newly constructed houses?—Yes, I had an opportunity of applying the constant supply to about 20 houses; I inspected the fittings, and provided at that time everything that I thought was necessary, and placed them under the constant service with a meter attached to the supply pipe for the whole; they were under no inspection during the whole of that time, they did as they liked with that water, but at the end of the year I took the meter again, and I found that they had used just upon 2,000 gallons per house per diem, which would give about 285 gallons per head.

1897. When was that?—In 1856.

1898. Was the other experiment in 1855?—No, those were all later; this was a prior experiment.

1899. Where was this?—This was at Morden-grove, Greenwich.

1900. Mr. *Henry Baillie.*] What class of houses were they?—They were houses of seven or eight rooms, and they took 285 gallons per head.

1901. *Chairman.*] Were they 10 *l.* or 20 *l.* houses?—I should think the houses were worth near upon 30 *l.* a year, but I am not certain about it.

1902. Mr. *Johnson.*] How long did you say you gave them this supply?—One year.

1903. The Plumstead Company, as I told the Committee, you bought up; that is to say, their works were transferred to your company?—Yes.

1904. *Chairman.*] Can you tell us what were the arrangements in the houses in which the experiments were made, how were the fittings, and what precautions were taken?—I had taken the precaution that the water-closets, which we always find the great cause of the mischief, should have no direct communication with our pipe, and that the only water they could get, should be through the waste water from the sinks in the houses, and I really cannot understand how this water was wasted.

1905. I do not quite understand you; was each house furnished with a water-closet?—Yes, each house was furnished with a water-closet, and that water-closet was supplied with water from the waste water, from the sink of the house; the water-closet in this case was at a lower level than the house itself, being on the ground, and that allowed the passage of the water from the sink to the great drain; the drainage of the house passed through the water-closet and hence into the sewer.

1906. Was there a cistern in addition to the water-closet cistern?—Yes there was.

1907. And did that cistern draw off over the sink?—Yes; and they also had a pipe direct from the main into the sink.

1908. Had that cistern a waste pipe as well?—Yes.

1909. And had the water-closet cistern a waste pipe?—There was no cistern at the water-closet. The only mode in which the water-closet could get the supply was through the waste water that ran down the sink of the house.

1910. It was not a real water-closet, but there was an apparatus to turn the water on through it?—No; there was no water apparatus at all.

1911. They could only flush it by turning the water on to the sink, and letting it run through?—Yes.

1912. Was that the arrangement in the larger experiment at Woolwich?—No; there of course we took the thing as it arose. Every house used it and wasted it *ad libitum*.

1913. What were the fittings in those houses?—I cannot say. They were of a very ancient date. I am not aware of the nature of fittings.

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1914. Had they, for the most part, cisterns?—Yes; all the cisterns had waste pipes.

1915. Had they double cisterns, one for the water-closet, and one for the house?—Water-closets were not very general at that time; but wherever there was a water-closet no doubt there would be a cistern to it, but I cannot tell whether there were closets in all the houses.

1916. Mr. *Kekewich.*] Do you recollect the circumstance of the cholera breaking out with great virulence in some lane at Woolwich?—Very well.

1917. In what way were those houses supplied with water. Had they a constant supply?—No.

1918. Had they any cisterns?—Yes; they had cisterns in some cases, and in some cases they had not. They were in a very wretched state.

1919. Had they a constant supply of water?—No.

1920. Mr. *Johnson.*] You have given us those instances at Woolwich, and this small block of houses which you have adverted to at Greenwich; I am about to ask you upon the same subject-matter with regard to Plumstead. Whilst the Plumstead Company managed their own works did they not endeavour to carry out the principle of constant supply?—Yes; they did.

1921. Can you tell me the result of that constant supply?—Speaking from my own knowledge, the houses in the upper part of the district they could not supply at all, and we were obliged to supply for them, and there were general complaints all along that level. They were using then, perhaps, 600,000 gallons a day for the supply of those houses.

1922. May I take it that it is at Plumstead where there is that great variation in the level of the different houses?—That variation applies to the whole of our district, Plumstead included.

1923. In the instance that you have now given us at Plumstead it was a limited area, was it not?—Yes.

1924. There was a great variation in the level, was there not?—Yes.

1925. They did give them for a time the constant supply you say, and an enormous waste in the consumption was the consequence; when you took to the works did you continue that principle?—No, we did not; we found it was impossible to satisfy the upper consumers, whilst the lower ones were letting the water run to waste; in fact the complaint was loud on all sides that they could not get water enough, although it was wasted in such an enormous quantity; we then adopted our usual mode, and they had one-half of the quantity that they had before, and everybody was well supplied.

1926. You were obliged to reverse the order of things, to abandon the constant supply, and to adopt the intermittent supply?—Yes.

1927. And the result was, that everybody, whatever the level of the house might be, had a sufficient supply of water?—Yes, the complaint ceased at once.

1928. On behalf of the company whom you represent, I suppose you are not averse to the principle of constant supply; but the difficulty is in carrying it into operation?—I am very favourable to the principle of constant supply, and I do not think there would be much difficulty in carrying it out even in our district, provided that this inordinate waste could in some way be stopped.

1929. What do you suggest as a means of stopping this inordinate waste?—I cannot suggest anything beyond a thorough watching, a regular sort of water police, as it were, to be established over the whole district to see that the fittings were kept in order, and that the whole of the restrictions named in the Act of 1852 should be strictly observed on all sides; if we could get rid of the waste there would be no difficulty about the constant supply; there may be some trifling engineering difficulties which we must get over, but if we are protected from waste there is no difficulty in the matter.

1930. Am I right in assuming that the evil is aggravated, as necessarily it must be, in a district which is so different in level, and that the waste in fact, deprives those upon the upper level of the supply of water which they would otherwise get under the present system?—Yes, it becomes a most serious matter; because we are not only losing the water which the upper tenants require, but we are also losing the whole power and force which we are obliged to exert to supply that water.

1931. And you would make the upper customers, unless there were precautions such as you have described, entirely dependent upon the waste, or economy of those below?—Yes, in fact in a district like ours, we are practically obliged

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obliged to divide our district into two levels for the purpose of giving our intermittent supply, and we have distinct mains, distinct engines, and two distinct and separate levels.

1932. Your customers are supplied, are they not, direct from the mains; you have no reservoir; you, in fact, pump the water direct into the mains?—Yes, we have very little reservoir storage indeed.

1933. And that storage, I think, is merely to economise the water which the engines pump in excess of the immediate requirements, is it not so?—Our summit reservoirs are to equalise the action of the engines, and, in case of fire, also to have an immediate ready supply at hand.

1934. You have got a list of the dividends in the return which has been made, and you know that the maximum dividend is 6 per cent.?—Yes.

1935. Am I right in stating that the average dividend has not exceeded 2½ per cent.?—Yes, that is so.

1936. Have you a list of the dividends showing the variation?—I have not it, unfortunately, with me.

1937. I think in your return, it only gives the maximum, and does not give the periodical variations; but that is the fact you know, that the average is 2½, the maximum being 6 per cent.?—Yes, it is a fact that for many years we paid no dividend at all.

1938. Colonel *Hogg.*] Do you find any waste in the Government establishments under the constant supply?—As they pay for all they use, it is a matter of indifference what they use or what they waste.

1939. Is there much waste?—I have no doubt that there is.

1940. What is the quantity per head?—I do not know.

1941. *Chairman.*] They use water for the works, do they not?—Not so much for manufacturing purposes as for the general supply, but I cannot answer the question precisely.

1942. Mr. *Kekewich.*] Could not you afford a constant supply to persons living in the higher level by having a storage reservoir into which you could pump your water from the wells and then let it flow into the lower levels?—There is not the slightest difficulty; the only question is whether any supply would be sufficient unless we were protected from waste; it is not an engineering difficulty so much as it is the actual provision of the supply, and to know where it is to come from if they are to waste it *ad libitum.*

1943. *Chairman.*] It was owing to the running off to waste so much at the lower levels that there was not enough to supply the upper levels?—Yes, even on our system we must have two levels.

1944. Mr. *Kekewich.*] There is no other means of preventing that waste, is there, except by cisterns?—One of the principal things is that if we do away with the waste pipe of the cistern we should be tolerably safe, and, with some precautions, with regard to water-closets.

1945. Mr. *Johnson.*] I think you heard from the witnesses who were examined by my learned friend what would be the probable cost of the fittings adapted universally to the constant supply; have you formed any judgment in your own mind of what would be the cost, or do you merely endorse what they said upon that subject?—It is a very wide question—in our case our pressure is very enormous.

1946. Because you are always forcing the water?—Yes, our levels being so various we are obliged to give our maximum pressure even at the low district; when I tell you that our lower district requires the pressure of 180 feet head of water, the effect of leaving it constantly in supply would infallibly be to damage a very large number of pipes and split them, so that in providing the constant supply at a pressure necessary to supply our district, you would have not merely to put careful fittings, but you would have to renew the pipes entirely in almost all the houses.

1947. You are speaking now of your district alone?—Yes.

1948. In your district, without traversing the whole of the metropolis, what, in your judgment, would be the cost per house of adapting the fittings to the constant supply?—About 5 *l.* a house.

1949. Mr. *Henry Baillie.*] Would it be a constant supply with cisterns or without cisterns?—It is a matter of perfect indifference how they take the water, provided they do not waste it, either with or without cisterns.

1950. Would that be the estimated cost with cisterns or without cisterns?—

As cisterns are usual, and we have cisterns at every house, or are supposed to have, it would merely include the necessary alteration in the pipes and fittings.

1951. Mr. *Johnson.*] I must ask you about the price of the supply, and the graduated scale; can you give it us shortly?

Chairman.] Perhaps you had better furnish a table of the rates, accurately made by the officers; we want the actual rates.

1952. Mr. *Johnson* (to the *Witness*).] Can you give us in a tabulated form the actual charge, adapting it to the maximum in the Act?—If you look at No. 7, it will give it. I may say that this scale in our Act is of a very recent date; it has not been in operation more than two years. We have not disturbed a vast number of our old tenants at all, although we know that they are underrated.

1953. Many of your old tenants are supplied upon some terms agreed upon before this Act came into operation; is that so?—No, it is not quite so. I know from my own personal experience that there are some districts where the whole of the houses might be raised in accordance with our scale, but we hesitate to do so in the case of old consumers.

1954. Were they supplied before at an average rate?—Yes.

1955. Then, in fact, it is as I say, that, although you have got an Act of Parliament which probably, in many instances, would enable you to raise that rate upon them, they stand upon the amount which they agreed upon with you prior to that Act coming into operation?—Just so.

Cross-examined by Mr. *Cripps.*

1956. I see in the report of your officers, speaking of your company and the constant supply, they say, "For this" (that is a constant supply, and so on) "they are perfectly prepared;" that is the case, is it?—Yes.

1957. Then it is simply a question of how the waste can be prevented?—That is my opinion.

1958. *Chairman.*] Does that mean over the whole of your area of supply you are prepared?—Yes, I am speaking of my district.

1959. Then the reservation in the Act is unnecessary as regards a constant supply in your district, which limits it to 180 feet?—That is one point to be considered; since the passing of that Act we have increased our power of supplying under constant service about 100 feet in addition, but there are some parts where it might be impracticable still.

1960. Mr. *Cripps.*] So far as I understand the possibility of supply, you could do it, but for this simple question of preventing waste?—Yes; I may say that there are some few extreme points of our district which are so far beyond any limit at which we can supply a constant service, and which must be specially supplied at a given time; Chiselhurst Common, I may instance, and the summit of Shooter's Hill. There are very great elevations, and as we have no commanding reservoirs, it would be essentially necessary to give them an intermittent supply.

1961. *Chairman.*] What is the level now to which you could extend your constant supply as regards your present arrangements?—We could extend our constant supply to the height of 250 or 260 feet.

1962. Mr. *Cripps.*] You have already two systems of supplying the higher and the lower level?—Yes.

1963. The proportion of waste would depend upon supervision, I suppose, and upon improved mechanical contrivances, as regards the fittings?—Yes.

1964. As regards the supervision in either of those experiments that you tried, was there any supervision at all?—No; we took the very worst case that could happen.

1965. As regards the other point, namely, the mechanical contrivances, they were precisely the same as had been in use on the intermittent system?—Yes.

1966. And no notice had been given to the parties in either case that anything was going to be done?—No; we wished to know the worst of it.

1967. Were those the only two experiments that you tried?—There were a number of minor cases, which would hardly be considered experiments.

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1968. I suppose you have given us the two worst?—We wanted to know what would actually be the worst state of the case.

1969. Am I to understand that in those experiments which you tried, the two which you have given us are illustrations where you think the waste was greatest?—No; I think there were cases where the result was still more pointed. We had occasion to supply a small block of houses about three or four years ago, under the constant service, and I considered it in my own mind as an experiment. A meter was placed there, and in the arrangement which we made with the owner, we said, "We cannot do this unless you will at least pay us your present rate." He agreed to do that, and so long as he had the supervision and care of it, he never exceeded the rate, but when he fell ill and eventually died, the waste became most extravagant, and it must be discontinued.

1970. You infer from that that some supervision is necessary?—Yes.

1971. *Chairman.*] What class of houses were those?—Small houses of about 4 *s.* or 5 *s.* a week rent.

1972. Mr. *Cripps.*] What was the class of houses which you gave in the first instance, the 20 houses in a block; what were the class of residents in those houses, and what class of life would they be in?—They were mostly bank clerks, or the houses were adapted to that class. I do not know them personally, but the houses were adapted to persons with an income of not more than 300 *l.* a year.

1973. In those houses the water-closet system could not have been the cause of the waste?—I expect that was the only channel which the water passed through.

1974. But still it was not actually due to the action of the water-closet system?—Not in this case.

1975. It must have gone off in the first instance by the waste pipe, before it got to the water-closet?—Yes.

1976. To what cause do you attribute the great waste in that case?—I think one reason of the waste in this case was, that the pressure was very great at this point, that is one reason. The next thing is, I think, that very soon after I left it in their hands, the taps and pipes must have got deranged.

1977. Then you tried it at a place where there was great pressure and deranged taps?—No; excuse me, the taps were perfectly new, the houses were all new, and everything was perfect as I left them. I only suppose they became deranged as a cause; there must have been some cause of that kind.

1978. I am asking you the cause of the waste as far as you can make out; if they became deranged after the experiment that would not have made an alteration?—My object was to know precisely what would take place where the thing was left without supervision.

1979. I want to get your own opinion as to the reason of the excessive waste in that case. You tell me that one reason is, that there was great pressure; and the other you said was, that the taps and pipes became deranged?—It must have been so, as a matter of course, because there could be no other mode in which the water could have passed into the drains at that extraordinary rate.

1980. That is one of your reasons that the taps became deranged?—I have no doubt of it.

1981. Mr. *Baillie.*] Might they not have left their cocks running, in order to flush the water-closets?—It might be so; it is a very common practice.

1982. Mr. *Cripps.*] But the waste must have begun at some higher point than the water-closet, and have run down there?—I cannot say positively whereabouts it began or ended.

1983. One Honourable Member of the Committee asked you a question which I should have liked you to have been able to answer. You say that in the Government establishments which are supplied with constant pressure there is a meter?—Yes.

1984. Does not that give you the means of testing, and being able to ascertain the number of persons supplied with the number of gallons per head?—Yes; there would have been no difficulty in doing that if I had any object in doing it, but I had none, and have made none.

1985. *Chairman.*] Could you furnish the Committee with the number supplied through this meter?—It is a question for the Government officers; I will endeavour to get it through them.

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1986. Mr. *Cripps.*] It could be done, could it not?—Yes; I think it could be done very readily. I could not do it myself; I have no power myself to comply with this request, but if the request was made through the Government officers the thing could be done readily.

Mr. *Johnson.*] If the Committee would intimate their desire, it would be done.

1987. *Chairman.*] Of course care must be taken that any consumption of water for the works is excluded, so that we should not be led into any great error?—Precisely so; they supply themselves for their machinery.

1988. Mr. *Cripps.*] When you speak of the expense at 5*l.* a house, you include the alterations of the pipe to the distributing main, I suppose?—You may take that as the average. I have no doubt that, in a very large number of cases, you would have to take up the present pipe of connection from our main as far as it extends to the house; that would be the principal part of the expense.

1989. What are the dimensions of your supply pipe?—We have very few communication pipes under three inches diameter.

1990. I mean those pipes which you would have to alter; the service pipes? —They would be mostly three-quarter inch pipes.

1991. What would have to be altered would be the pipes that supply each particular house?—Yes.

1992. And those you say are three-quarter inch pipes?—Yes.

1993. What weight of lead to the foot or yard do they represent?—They vary excessively; I cannot give you any answer to that question. We never interfere with the internal fittings of a house at all.

1994. Cannot you tell at all?—No.

1995. Have you no rule at all?—No rule whatever.

1996. Are persons allowed to put down whatever they please?—Whatever they please.

1997. Is that the ordinary custom of the London Companies?—We find it in our case much better to do so; we would rather have a large pipe put down than a small one.

1998. Many of those pipes at the present time may be in a very inefficient state, for aught you know?—I think it is very likely; we are obliged in our own case to employ two or three men constantly going round.

1999. But you have no control over the supply of those pipes at all?—No; not over the supply of those pipes; at least we do not exercise it.

Re-examined by Mr. *Johnson.*

2000. Why would you rather have a large than a small pipe?—We find that the sooner we can get a cistern filled the less the waste will be in that district, and therefore the larger the communication pipes are, the better.

2001. *Chairman.*] That is to say, for an intermittent supply?—Yes.

2002. Mr. *Johnson.*] How would it be in that respect on the constant supply; all those communication pipes would have to be altered where they are beyond a certain diameter, would they not?—Mechanically not, because we could make arrangements to reduce the diameter of the pipe at the orifice, where it entered our own service pipes; there would be no necessity on the score of diameter for taking the pipes up, but where the pipes were not sufficiently strong, it would be a matter for the inhabitants themselves, for their own safety, to do so.

2003. That is with regard to the thickness of the pipe itself?—Yes.

2004. Do you include in that cost the opening of the ground wherever those pipes have to be altered, whether in diameter or in thickness?—Yes.

2005. That is included in the 5 *l.* a house?—Yes; I think it would cover that.

2006. You spoke of your own mains, or district mains, or service pipes, or whatever they are; I mean before you come to the communication pipes, you say there is a great pressure upon them already with an intermittent supply, and those would have, as I understand you, to be altered to pipes of greater thickness and greater power of resistance, is that so?—If you were to keep the water constantly on to any house with a weak pipe it would infallibly burst sometime or other, and the greatest damage would ensue in consequence, and we have been threatened with actions more than once on that account.

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2007. Those are the communication pipes of your customers?—Yes.

2008. You tell me that they would require, particularly where they were of larger diameter, to be made of great thickness to resist the pressure?—Yes.

2009. I am now going to the pipes which your company supply; would they be sufficient as they are at present?—Perfectly sufficient.

2010. Then there would be no extra cost as regards those?—Not the slightest.

2011. Just one word as regards the experiment which you made by agreement; where you say taps and pipes were provided in the first instance, and you inspected them to ascertain their character, did you discover that there was this waste at first when they were in good working condition, or was it after they had got deranged, or had had time to get deranged?—Those were new houses, and I had opportunities of seeing them from time to time as they were being built, and as they became tenanted and occupied I no longer took any notice of them; I left the pipes in good order.

2012. You cannot say whether it was the fittings which got out of order and became deranged, or whether it was the waste of the customers who had the constant supply furnished to them?—As I removed all inspection from them, I could not tell.

2013. You only know there was so much waste, whether from one cause or the other?—Yes.

2014. *Chairman.*] Were you the engineer at the time when the Act of 1852 was passed?—Yes; I have been engineer for the last 30 years.

2015. On the passing of that Act, are you aware whether your company constructed a map according to the provisions of that Act?—Yes, here is one sheet of it (*producing the same*).

2016. Have you indicated on this map the mains and the district mains?—Yes, everything.

2017. How is that indicated?—With regard to the district mains, I think there is some misapprehension about it, the term is altogether technical as regards waterworks companies; we distinguish the mains as those pipes which are always charged; the principal mains would be those which take the line of the district throughout.

2018. How are they distinguished on the map?—We make no distinction between district mains and principal mains, because we do not know the term district main.

2019. But the Act of Parliament used the term district main, and it said that you were to show on your map every main and every district main?—We have shown every district main, but what a district main is, according to the Act of Parliament, I cannot tell; I have no doubt that what was intended, you will see marked on this map.

2020. You could not understand the Act of Parliament, and therefore you did not make the map?—The map was made in due course.

2021. The Act of Parliament directed you to make a map showing the mains and district mains separately?—I am not aware that it was to be done separately.

2022. That is the Act, is it not?—I do not think so.

2023. Mr. *Cripps*]. The 17th section of the Act of 1852 provides that "Every company shall, within one year after the passing of this Act, cause a map to be made of the district within which any mains or district mains shall have been laid down or formed by them, on a scale not less than six inches to a mile, and shall cause to be marked thereon the course and situation of all existing mains and district mains, and shall, within six months from the making of any alterations or additions, cause the said maps to be from time to time corrected"?—We have distinctly complied with that Act. (*The Witness explained the map to the Committee.*)

2024. *Chairman.*] Then you have shown all the mains and district mains?—Yes.

2025. With what distinction of colour?—No distinction at all.

2026. And have you put in all the pipes?—We have put the whole of our pipes on this map.

2027. Without any distinction?—Yes.

2028. Therefore you have not shown every main and every district main separately?—No, we are not called upon to do that.

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2029. That is your view?—Yes.

2030. The 18th section states that "Every company, on the application of any person supplied with water by such company, shall furnish to such person the particulars of any district main," so that they must be kept separate; then we understand from you that you could not distinguish from the Act of Parliament what was meant by main and district main, so as to put them on the map?—The question has never been asked in any case.

2031. You have made a map, showing every pipe that you have laid down, without distinguishing it into mains and district mains?—Yes, that is so.

2032. What is your idea of the meaning of a district main, as mentioned in the Act?—If we take it as regards the sense of the Act itself, no doubt it was meant that no block of houses should be placed under a constant supply by one pipe commanding them, without the consent of a certain majority.

2033. Would not it seem that every district main meant the quantity of mains which were covered by the one operation of turning on the water by one turncock?—That is just my version of the matter.

2034. That is not exactly what you explained, and you have not shown that on your plan, have you?—Yes, I have shown it separately.

2035. Can anyone looking at this plan find out the exact streets which each turncock, by turning a cock, commands?—Yes.

2036. Then if this plan is made according to the Act, it might be discovered?—Take this little block of houses (*pointing to the map*), you will observe the cock commanding it; unless four-fifths would consent, of course that could not be done.

2037. You mean four-fifths of the inhabitants of the houses which were served by that one operation of turning on the cock?—Yes, I have no doubt that is what is meant.

2038. Is your supply system laid out with reference to any contour lines of elevation?—It is; we are compelled to do so.

2039. How many different levels are there?—Three.

2040. What is the difference of those levels?—One would be the level of about 140 feet, the other would go about 50 feet above that, and the other would be about 90 feet above that.

2041. But intermediately between your present three levels, is it impossible to re-arrange the connections of the pipes so as to introduce intermediate contour lines?—It is not impossible, but it would involve enormous difficulties; for instance, in the selection of sites for reservoirs, and the expense of purchasing them.

2042. I am asking you first about regulating the connecting pipes merely?—I do not think there would be much difficulty in that in our district, because in a district so peculiar as ours, what will apply to the East London, will not apply with regard to ours; we are compelled so much to have in view the necessity of keeping the separate levels distinct, that I do not think there would be the difficulty that would exist in other districts.

2043. Could you not, with very little trouble, by the introduction of pipes and cocks, or appliances of that kind, cut off the different systems so as to bring them into levels of 50 feet, or at all events to diminish the first one to one-half?—As regards pipes that would be the least part of the difficulty.

2044. Could you conveniently cut it off into elevations of 50 feet, so as not to go from 1 to 180 at once?—That is a question which I cannot answer offhand. There are some points where it could, but there are some points where it could not be done.

2045. Generally speaking, you could do it, could you not, at very little expense or trouble?—The expense would be enormous.

2046. I mean as regards the pipes?—Not much as regards the pipes, comparatively speaking, certainly.

2047. Having arranged the pipes, how many intermediate reservoirs or cisterns would you have to build to regulate the head of water on each system?—This is quite new ground to me, and it would involve an immense amount of inspection of the ground itself before anything like an accurate answer could be given.

2048. Still with your intimate knowledge of your own power, how many regulating cisterns do you think you would have to introduce?—The ground undulates in all directions, so that it is a very wide question, and it would require very close examination to give an answer.

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2049. How many do you estimate approximately from your knowledge?—I should not like, as an engineer, to give an answer to that question.

2050. What would be the expense, do you think, of erecting intermediate cisterns to regulate the supply if you were to divide the present maximum supply into two or three different levels?—That I cannot say.

2051. Do you think it would cost 1,000 *l.*?—In the first place we should have to procure the land which would be absolutely necessary for the reservoir, and the reservoir must be of sufficient capacity for two days' supply of the district.

2052. Why so?—It must be placed beyond anything like a chance of accident.

2053. If water is running in at a higher pressure than it is going out, what is the necessity for your reservoir?—Any re-arrangement of the machinery in which, of course, the works must be made perfectly distinct, must be attended with very great uncertainty, indeed. At present every engine on either level is made applicable to the whole, but now you are separating them from the whole, and making it dependent upon its parts, and therefore the danger would be very great as to any point being without any water supply, and provision must be made by an increased storage of water to meet that.

2054. The same thing is done by duplicate arrangements; might you not put in a storage reservoir with duplicate arrangements, so that you might always protect yourself?—But we have no reservoir in that sense of the word. I believe the whole of our reservoirs and our storage would scarcely hold three or four hours' supply.

2055. Do you want anything more than a regulating cistern; is there any necessity for a reservoir at all?—Yes, as I said before, if you divide the district into separate portions, no one portion can be assisted by the others, you must make a sufficient arrangement in each case to meet all contingencies.

2056. Are not contingencies and accidents sufficiently provided for by a duplicate arrangement of cisterns?—Yes.

2057. You do not find the London and North Western Company, for example, for their supply of water at an engine station, have an enormous reservoir; are they not content with having duplicate cisterns from time to time?—I am not acquainted with their mode of supply.

2058. Then if we had the evidence of an engineer that such an arrangement could be made for within 5,000 *l.* you would not agree with him?—Oh dear no; I am speaking of the Kent district; you ask me to divide our district up into contour reservoirs, and that must cost an enormous sum.

2059. That is assuming that you must have a reservoir for several days' supply?—For two days' supply for each district.

2060. You do not think it possible to be done with intermediate regulating cisterns?—I do not think it could with our system.

2061. If it could be done in that way then this objection which has been raised about the bursting of pipes would fall to the ground?—In our case a great deal of it would, but it would cost much less for the company to renew the whole of the pipes than to adopt the system which you suggest of contour reservoirs.

2062. That would depend of course upon the expense of the system of contour cisterns, and not reservoirs?—Yes.

2063. Can you explain why your supply of water has so enormously increased within the last few years; is it from the increase in the number of houses supplied?—Yes; the principal thing is the enormous increase of houses in the district, and the extensions of our pipes widening out into different portions; and again, we find a constant increase annually as sewage arrangements progress in various towns; wherever sewage is introduced the supply becomes greater.

2064. Of course where the water-closet system is introduced you have to give a much larger supply?—Yes.

2065. How often do you turn on the water on the intermittent system?—Six times a week.

2066. Why is it not turned on on the Sunday?—There is no necessity for it because the rule is of very ancient date, and everybody has provided himself with a cistern for two days' supply: I mean those that have cisterns.

2067. But supposing the houses are thickly populated and the cisterns are small, then the supply would seem to be insufficient?—We have no complaints of

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the kind, but certainly it would be an advantage to supply some of those houses on Sundays.

2068. Have you never had any request to turn the water on, on Sundays?—Very rarely, except in the time of cholera, when we immediately complied with it over the whole district.

2069. What is the number of people employed in your district in turning on the water?—We have 10 turncocks and about 10 labourers.

2070. What are their wages?—They vary from 1 *l.* 2 *s.* 6 *d.* to 1 *l.* 6 *s.* a week.

2071. Would it involve any increase of the establishment if you turn the water on seven days a week?—Just proportionate to the length of time that the men are at work. It would add one-sixth more to the expense, and it would involve also, in our case, the employment of the whole of our engine power. We have no storage reservoirs, and we must set the whole machinery going, and everything connected with the distributing apparatus over the whole district.

2072. Have you not reservoirs sufficient for a day's consumption?—No, our reservoirs are subterraneous.

2073. What would be the expense to the company of constructing a reservoir to hold one day's supply?—It would be difficult to get the ground, and after getting the ground it would cost 50,000 *l.*

2074. Have your receipts very much increased within the last few years?—Yes, very much.

2075. And the parishes, many of them, have been reassessed during that period?—They have.

2076. And their rateable value has been largely increased, I believe?—Very largely.

2077. Therefore your rates by the operation of that process have been increased also?—No, the rateable value does not govern our rates; the parish books do not govern our rates at all.

2078. Do you assess the parishes yourselves?—We assess the houses ourselves.

2079. Is your assessment above or below the parish assessment?—Above.

2080. Therefore you have not got any advantage then from the raising of the rates by the re-assessment of the parishes?—It does not affect us at all, except that we have to pay enormously increased rates ourselves.

2081. To what do you ascribe your great and sudden increase of dividend?—It has been very progressive; we have gradually risen from 30 *s.* up to 6 *l.*; by very slow gradations.

2082. When was the last increase?—About three years ago, I think.

2083. What was it previous to that?—Five and a-half per cent.

2084. How long ago is it since it was 5 per cent.?—We rose very rapidly from 5 to 6 per cent.

2085. Do you not think it is reasonable that the company should make provision for giving a daily service of water, or rather that all the inhabitants should be compelled to provide for a two days' supply?—You see the thing is done; they have provided for two days' supply.

2086. In the lower district have they?—In all the districts.

2087. In the smaller houses?—Such a supply as it is. I am sorry to say that the whole of the supply to the smaller class of houses is very bad, not only in our own district, but everywhere else. The arrangements on the part of the landlords are very faulty.

2088. Are there any houses in your district without cisterns of any capacity, or without separate cisterns?—Yes.

2089. Those are blocks of houses, I presume?—Yes; small blocks of houses.

2090. Is there one cistern for the whole block of houses?—Of course in many cases they have no cisterns at all.

2091. What do they do in such cases?—They retain the water in butts or tubs, or whatever they can get to hold it; but things are mending in that respect compared to what they were.

2092. In those cases you intermit the supply one day in the week?—Yes.

2093. How do they store the water?—I presume in the same way as they would under the daily supply; they must retain enough on Saturday to last them over till Monday.

2094. Do those houses pay the water rate to you?—The landlords pay it.

2095. Do

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2095. Do they pay the full water rate for those houses?—They compound the rate.

2096. Then you get less?—Twenty-five per cent.

2097. Do you make an allowance to the landlord of 25 per cent.?—From 20 to 25.

2098. And he makes no allowance himself to the tenant?—I do not know what his arrangements are.

2099. There is no arrangement in the house to supply them with water?—That is not universal. There are cases in which it is as bad as may be imagined, but in other cases there are proper arrangements.

2100. Is there a cistern or a stand pipe to supply those houses where there is no separate cistern in each house?—There would be a cock carried on to the premises, and generally it would be supplying, in almost all cases, a small butt.

2101. I began, as you remember, with the case where there was no separate receptacle in each house?—I think those must be very exceptional cases, where there is not some receptacle or other. There is some provision, bad as it is.

2102. Is it a beer barrel, or what?—Any kind of receptacle they can get; a beer barrel, an old tub, or a sugar tub; but latterly they build most houses with cisterns which have a connection with the water-closets, and are used for the general supply also.

2103. Are there many houses in your district without any cistern in connection with the necessary, for it cannot be called a water-closet?—We do not allow any supply to a water-closet, unless a cistern intervenes between it and our pipes.

2104. Then if there is no cistern, there is no service of water at all to that necessary?—No; not to that necessary.

2105. How many houses do you think there are without water-closets?—I cannot answer that question.

2106. But you have a separate rate of charge where they are with or without water-closets?—No, we have not.

2107. They pay a rate which is to include one water-closet, whether they have that one water-closet or not?—Yes; there is no extra of charge made for the water-closet. The charge in all cases is very low, and includes one water-closet to every house.

2108. Although there may be none, they pay the same rate?—Yes.

2109. Could you give us any idea of the number of the houses that are without water-closets in your district?—We have not made a separate inspection, and it would be a very wide guess if I were to answer that question.

2110. As a rule, does the system now prevail of building small houses with water-closets?—Yes; with water-closets, and small cisterns over them in most of the new houses.

2111. When did that system begin; can you tell us generally?—From my own observation, I should say that it has been more general these last four or five years.

2112. Previous to the last five years may we take it that it was still the practice to build that small class of houses without water-closets?—Yes; they had no drainage at that time, and anterior to that time.

2113. Has any effort been made to convert those previously erected necessaries into water-closets in your district?—I cannot tell you that.

2114. Mr. *Henry Baillie.*] If a family consumed more than their usual quantity of water on Saturday they would be without it on Sunday, according to your system, would they not?—Yes they would.

2115. What is the use of what you call a water-closet which only has a thin stream running from the sink into it?—I do not think there is any use at all in allowing a small continuous stream to pass through the water-closet; it has no effect whatever; one pail of water applied properly in bulk would do more than a small flow of water for a continuous period.

2116. In point of fact, such water-closets, where they are put up, are of very little use?—Of very little use indeed; almost all the water-closets might be flushed by pouring a pail of water down; I am speaking now of extremely small houses.

2117. *Chairman.*] Unless they get that pail of water while the service was going

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going on they would very much retrench their domestic supply?—Yes, I think they would.

2118. Mr. *Kekewich.*] If you supplied water on a Sunday it would be an exception to the general rule, as none of the water companies supply water on Sundays, do they?—I believe there are some cases in which the London companies do, but as a general rule the supply in London is six days a week.

2119. And you supplied it on Sunday as well as they did at the time of the cholera, I believe?—Yes.

2120. Is the population increasing very much within the area of your water supply?—Very largely indeed.

2121. Is building very much increasing?—Yes, very fast indeed.

2122. What kind of building?—All classes; but we find that they are building a much better class of houses now; taking them as a whole they are a much better class than they were building formerly.

2123. Are they a class of houses in which there ought to be a water-closet and cisterns?—Yes; those houses are all well supplied.

2124. Are they generally to be found in the houses that are now building?—Yes, universally.

2125. Colonel *Hogg.*] Do not you think that a Sunday supply would be beneficial to the health of the population, especially in the poorer districts?—I think it would.

2126. Have you found any improvement in the health of the inhabitants of the district since the distribution of well water?—I cannot answer that question, but I could refer you to the replies of the medical officers to the questions put to them by the Registrar General. They made special reports upon that subject.

2127. Do you find the water of your wells of the same average purity?—Yes, the quality is nearly the same.

2128. Do you think that the inhabitants would like the perpetual inspection of their taps and cocks upon the constant system?—It is a terrible fight as it is.

2129. Do you think they would prefer the present intermittent system with the present supervision or a constant supply with a stricter supervision?—I am quite certain that if the inhabitants were called upon to lay out a single shilling upon their houses they would object to the constant supply altogether.

2130. Would your charge be higher for the constant supply than it is at present?—No, with protection from waste it is not of the slightest consequence to us how the water is sent, in fact it is an impossibility without protection.

2131. Do you think that there ought to be stronger power given to the local authorities to compel landlords to find cisterns in small houses?—It would be better; but I do not think they exercise the powers they have at present to the full extent; it too often happens that the local boards are really the owners of those small properties we are talking about.

2132. Can you give me any instance of want of supervision?—I should say that over the whole district there is not that supervision on the part of parochial boards that there ought to be.

2133. And you think that they do not exercise their present powers?—Not to their fullest extent.

2134. Mr. *Benyon.*] I think you said that the actual pumping of those wells had been tested to 14,000,000 gallons?—Yes.

2135. And I think that was at the rate of 14,000,000?—Yes, they actually deliver 14,000,000 gallons.

2136. And one well, I think, was tested at 5,000,000 gallons?—Yes.

2137. Therefore you do not agree with the opinion, that the wells in the chalk formation would give an average delivery of from half a million to a million and a half?—No, my experience is quite the reverse.

2138. You mean in the particular district to which you have referred?—Yes; but you must sink a well at the proper spot, otherwise the effect would be as you have stated. If you followed up the line of the fault in the chalk, which extends for many miles, and which commands the elevated ground above it, you will doubtless find water there, but elsewhere you may go a very few yards from this fault and get no water at all. I will instance the case of the Greenwich Government Hospital; they laid out an enormous sum of money there on the wrong side of the fault, and had no water, not sufficient to supply the establishment.

2139. *Chairman.*] Is there a fault then running east and west, parallel with the

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the Thames, through the chalk?—You may assume, wherever you find elevated ground passing from London down in the course of the Thames, that that elevation is due to the uprising of the chalk. Taking the line of the fault at Deptford, it extends eastward, along the line of the elevation of the ground at Blackheath and Erith, and passes over to Grays, and still further eastward; but beyond Grays I have no knowledge.

2140. Have you any knowledge westward?—Beyond our own district I have no knowledge; but we also find a parallel fault running to it in various parts of the district. We also find a fault running at right angles, broken up precisely as you would break up a mass of ice in a pond.

2141. Mr. *Henry Baillie.*] Do you believe that good wells could be found in the east London district?—I should think not, as compared with the Kent district.

2142. *Chairman.*] You are drawing from a basin which has its defined boundaries by the fault?—I believe that this upheaval of the ground which extends with the line of the Thames, prevents the water from Kent passing over to London, therefore the northern side is comparatively dry, whilst in the line of the fault the water is in superabundance.

2143. Mr. *Benyon.*] You do not mean to limit the supply of water from the chalk formation to the south side of the Thames; has not the north side of the Thames an equally good supply of water from the chalk formation in certain localities?—That may be so in certain places, but where you find the water escaping by rivers such as the Colne and many others, I do not think you will find much water compared with what is to be found in Kent.

2144. Is there not a very large supply of water at Grays, in Essex?—Yes; but that is on the same line of fault as our works.

2145. Is there not a very large supply of water at Watford?—There is a very large supply at Watford on the northern side of the Thames; but with regard to that, although it accidentally happens that the Lea is on the north side of the Thames, it really is part of the great fault which runs on the south side, and it is on that reason that you get the water at Grays.

2146. Is there not a very large supply at Ware, from a well which the New River Company have on the north side of the river?—Yes.

2147. Therefore the mere fact of the river has nothing whatever to do with the supply of water?—It has a great deal to do with it. I believe there is much more water in Kent than there is on the other side, on account of the absence of rivers.

2148. But it is practically inexhaustible on the northern side, as far as you know?—I cannot say; I do not know.

2149. You think that a constant supply of water would be a very good thing if waste could be prevented?—Yes.

2150. And that the waste arises partly from insufficient fittings, and partly from wilful waste, or at least negligent waste?—Yes, and wilful waste; but it is a very difficult thing to say, in the public mind, where use ends and abuse begins.

2151. Do you propose a sort of water police to check that waste?—Something of the kind must be necessary.

2152. A stricter superintendence than we have at present?—Yes.

2153. But a great deal of waste takes place at night-time, does it not?—Yes.

2154. Have you power to inspect during the night?—We have no power of inspection beyond certain hours of the day.

2155. Those hours are between nine and four, are they not?—Yes, something of that kind.

2156. Therefore, no stricter supervision on the part of the companies under the existing law would be available to prevent the waste during the night-time, at which time the greatest waste will take place?—Except having regard to the possibility of waste from bad pipes and fittings, and the nature of the supply generally.

2157. You assess the houses for your rate according to your own estimate, do you not?—We assess the houses according to the rent that they pay.

2158. But you do not adopt the rateable value under the Assessment Act?—No.

2159. You do that according to Act of Parliament, do you not?—In our

Acts of Parliament relating to the rating of houses for water, the words "annual value" are adopted.

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2160. Therefore you do rate them on a rate of your own, by Act of Parliament?—Our authority is an Act of Parliament, and our example would be the rent that is paid to the landlord, in nine cases out of ten. The parish take other circumstances into consideration besides the rent; the rateable value is very different from the annual value.

2161. Lord *Frederick Cavendish.*] Do you think it would be impossible to measure the quantity of water supplied to each house?—Not impossible, but awfully expensive.

2162. In the case of any question as to whether or not there had been a large waste of water would not it be possible to place a meter in the house?—Yes, it would be possible to place a meter, but where we supply so many thousands of houses at 7 *s.* or 8 *s.* a house, and the lowest class of meter that we have would cost about two or three guineas each, it becomes practically impossible, on the ground of expense.

2163. But if you had the power to charge an increased rate in case of waste in the consumption, would it not be possible to spread economical notions by fitting up meters in exceptional cases?—No doubt a meter is a great teacher of economy in water; but, as I said before, the expense of a water-meter is so great, that it would be practically impossible to put it into small houses.

2164. Mr. *Benyon.*] With regard to the Sunday supply, whence arises the difficulty, is it that you would not have water enough?—No.

2165. Then it would be merely because you do not like to work your men on Sundays?—Yes, and the cost of doing so.

2166. Then it is a question of employing your men on Sundays, and paying them additional wages?—Yes.

2167. Your contract with them now is not to work seven days in the week?—No; our men work 12 hours a day, and all beyond that they are paid overtime.

2168. Some water companies do give a Sunday supply now, do they not?—I believe there are some parts of the metropolitan district where they do give a Sunday supply.

2169. Mr. *Cripps.*] With regard to the 27th section of the Act of 1852, or the section of the Metropolitan Local Management Act, which has been substituted for it, has it often happened that applications have been made to you by the churchwardens or overseers for a compulsory supply of water to the houses?—We never had but one case.

2170. Was it by the churchwardens and overseers, under the 27th section, or since the Act has been altered, or by the vestry; how long ago was it; do you remember?—Eight or nine years ago.

2171. There has been only one instance?—Yes.

> Mr. *Johnson.*] I have no other witness except Dr. Letheby, who will be called by my learned friend, and therefore, when you come to the Kent case, my learned friend will kindly ask him about it, or I will do so if I am in the room.

2172. *Chairman* (to the *Witness*).] Is the fault of which you have been speaking laid down in the geological map which is published?—You will find that the fault in the neighbourhood of London will be best seen in a map published by Mr. Mylne, a geological map of the environs of London; and you will find also in Mr. Prestwich's "Water Baering Strata of London," there is a great deal of information upon that subject.

[The Witness withdrew.

Dr. *Henry Letheby*, called in; and Examined by Mr. *Clerk*.

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2173. You told us, I think, the other day, that you are Professor of Chemistry, in the College of London Hospital, and Medical Officer of Health of the City of London?—Yes.

2174. And you have been extensively engaged in inquiries with regard to the character of water for the supply of most large towns in England?—Yes.

2175. And I believe that since the year 1864, at the request of the Metropolitan

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litan Association of Medical Officers of Health, you have been making analyses of all the metropolis waters?—Yes, I have, every month.

2176. I believe the analyses which you have made have been duplicate analyses?—In some instances they have been duplicate; not in every case.

2177. You have, I think, before you a table showing the form of report which you have given in from month to month, of all the different metropolitan waters?—Yes; this is the form in which returns are generally made to the Metropolitan Association of Medical Officers of Health.

2178. That form gives the date when the waters were taken?—Yes, it gives the month during which the examination is made, the total quantity of solid matter per gallon, the loss by ignition, the oxydisable organic matter, according to the formula which I have adopted here, and the hardness of the water before boiling and after boiling.—(*The Witness delivered in the Paper.*) *Vide* Appendix.

2179. That includes the five Thames Companies, the New River Company, and the East London?—Yes, it does.

2180. But the Kent Company is not in this table?—Yes, the Kent Company is shown in this table; there are the five Thames Companies, the New River, the East London, and the Kent.

2181. It shows the comparative analyses of all the waters at that particular date?—Yes.

2182. I believe that recently you have been making a very close inquiry into the quality of the waters supplied by all the different London Companies?—Yes; Dr. Odling, Professor of Chemistry at St. Bartholomew's Hospital, and Mr. Abel, the eminent Chemist to the War Department at Woolwich have, with myself, been very carefully and closely investigating all the circumstances connected with the quality and quantity of the water supply.

2183. I believe that you have visited the works of all the different companies?—We have.

2184. For the purpose of inspecting their system of purification?—Yes.

2185. And have you examined the processes of filtration?—We have.

2186. Did you take samples of the water at each of the works before the water was filtered?—Yes.

2187. And also specimens of the water as filtered and supplied to the public?—We took samples of the water as it entered the works of the several companies, and we took samples of the water from the public mains, which samples represent the quality of the water as supplied to the public.

2188. I have here the different places where you took those waters; but you took them from particular mains?—We took them from the mains at the cab stands, for the most part.

2189. You have there, I believe, a table, No. 1, showing the samples of unfiltered water as they were taken from the different companies?—Yes. The first of these tables represents the general properties of those waters in the condition in which they are received at the works, and in the condition in which they are delivered to the public.

2190. Is the Kent Company included in this?—No, it is not.

2191. This table shows the water as unfiltered as it enters the works, and the condition in which it was taken from the several mains?—Yes, and the general results are expressed in a small table at the bottom of the large table, and it shows in a general way this, that the proportion of solid matter in the unfiltered water is greater than of solid matter in the filtered water, quite irrespective of the suspended matter. It shows also that the organic matter, as determined by incineration, is less in the filtered water than in unfiltered water. It shows that the hardness is less in the filtered than in the unfiltered water, and the general conclusion is that the process of filtration removes other things from the water than merely suspended matter; that it oxydises to some extent the organic matter, and that it precipitates, or rather takes up a certain proportion of the earthy carbonates dissolved in the water.—(*The Witness delivered in the Table.*) *Vide* Appendix.

2192. And the table shows to what extent in each of those waters the hardness is reduced by the mere process of filtration?—Yes; in the case of the Thames Companies before filtration the hardness of the water is nearly 14½ degrees, and after filtration it is 13·3. The hardness of New River unfiltered water is 15½ degrees, and when filtered 13½; the East London unfiltered, 14·4, and when filtered, 14. But I must say that the samples were not taken upon the same day, and they do not exactly represent the effect of filtering in any one sample of water; they are average examinations.

2193. Mr. *Kekewich.*] What is it in the case of the Kent water, which is chalk water?—The Kent water is not filtered, it is water which is drawn from the wells, and sent directly into the mains; it is a hard water, but it is not filtered.

2194. Would it become softer by filtration?—Not to any great extent.

2195. Mr. *Clerk.*] Would not it be in the same proportion as the New River water?—Probably it would; perhaps the degree of hardness might be lessened by filtration.

2196. With water pumped from chalk wells, it is not necessary to undergo the process of filtration for the purpose of removing organic matter?—It is not.

2197. This table also shows, does it not, the amount of organic matter which is removed from the water by filtration?—Yes; that organic matter being determined by the usual process of incineration of the solid residue, and it shows this, that in the case of the Thames water the organic matter is reduced from about 1·26 grains per gallon to 0·97, that in the case of the New River Company it is reduced from about 7-10ths of a grain per gallon to rather less than 6-10ths of a grain, and in the case of the East London water from 9-10ths to 3-10ths of a grain.

2198. Is that determined by incineration?—Yes, that is determined by incineration.

2199. You have also, I think, upon Table No. 1, the results of boiling upon those several descriptions of water as affecting the degrees of hardness?—Yes.

2200. The Thames waters are reduced, are they not, from 13 degrees of hardness, which is their state after filtration, to from 5·3 to 4·6?—Yes; taking the average, the primitive hardness of this water is 13·3 degrees, and the hardness after boiling for a quarter of an hour to 4·6, and in the case of the New River it is reduced from 13½ degrees to four degrees, and in the case of the East London from 14 degrees to five degrees, so that it may be said, that upon the average a quarter of an hour's boiling brings down all these waters to about between four and five degrees of hardness.

2201. Do the results which you find in Table No. 1, establish that the water supplied by all those companies, is a well aërated water?—Yes, they do; we have determined the proportion of gases dissolved per gallon in each of those waters, and the proportions range from about 12½ cubic inches per gallon up to nearly 15 cubic inches, and that gas consists to a very large extent of oxygen, about 15 per cent., or from that to 19 per cent. is oxygen.

2202. Is that an excessive quantity of oxygen for the purpose of oxydising any organic matter contained in the water?—Yes; the organic matter that is capable of oxydisation, as determined by the permanganate test, requires only on the average, in the case of Thames water, about 1-10th of a grain, or rather more than 1-10th of a grain of oxygen, whereas the quantity of oxygen dissolved in the water, and capable of oxydising that organic matter, ranges from 7-10ths to 9-10ths of a grain; you have, therefore, five times as much oxygen dissolved in the water, as is required for the oxydisation of the organic matter contained in the water.

2203. Does that show a very well aërated water?—It shows a very well aërated water.

2204. The table also shows, does it not, the quantity of ammonia in grains per gallon?—Yes, ammonia is another indication of the quality of water, and we find that the proportion of ammonia per gallon of water, is only expressed by a third decimal place; it is 0·003 of a grain.

2205. Is that as large a quantity of ammonia as is often found in the rain water of rural districts?—Yes; the rain water of rural districts I have found contain considerably more ammonia than that.

2206. *Chairman.*] What do you call rain water?—Water which falls from the clouds and is collected in clean vessels; that water contains more ammonia than is found in the water which is supplied to the public in London; and if ammonia be evidence of the existence of putrifying matter, the fact of there being so small a quantity of it in the water supplied to London, would indicate the absence of decomposing organic substances.

2207. Is the rain water, in the case you speak of, conveyed direct into a pure

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pure vessel?—Yes; I find that the rain water of this city contains nearly half a grain of ammonia per gallon.

2208. Mr. *Clerk.*] You have already explained what appears upon Table No. 2, so that I do not think I need go into detail upon that; it shows the different substances which you have ascertained dissolved in the different waters?—Yes.—(*The Witness delivered in the Table.*)

Vide Appendix.

2209. Is the result of all these analyses to show that those waters are in themselves good waters?—Yes; the second table gives the particulars of all the constituents, and the proportions of those constituents in the waters supplied to London, and the result of the examination is, that those constituents are not in excessive quantity, that there is nothing of a hurtful quality about them.

2210. *Chairman.*] Do you know what the excess of quantity is in each of those constituents which would make water unwholesome?—No, I cannot say what proportion of saline matter would make water unwholesome. We have had evidence that at Carrara that water may be drunk in considerable quantity which contained 92 grains of carbonate of lime per gallon, and we have found no evidence at all at the present time as to what proportion of saline matter in water is absolutely unwholesome.

2211. Lime, for example?—Generally speaking we say this, that a water containing more than 10 grains of carbonate of lime, or of its equivalent per gallon, that is to say having more than 10 degrees of hardness, is regarded as a hard water, at least on the side of hardness.

2212. At what point does it become unwholesome?—I cannot tell; there is no evidence to justify any opinion upon such a subject, or that would lead anyone to form an opinion as to the proportion of saline matters in waters, which render them unwholesome.

2213. For instance, take Tunbridge Wells; is there any evidence of the water there being unwholesome or unfit to drink in consequence of the presence of lime in it?—No.

2214. Have you never directed your attention to that subject?—Not only my attention, but that of everybody who has considered the question of water, and its effect upon the public health, has been called to that subject; but as far as I know at the present moment, with regard to carbonate of lime, there is no evidence that any quantity that water can take up, or even a sulphate of lime, if such water is used in moderate quantities, will actually injure health.

2215. Mr. *Clerk.*] The hardness of water may be due to other causes besides the presence of carbonate of lime, may it not?—It may be due to magnesia to some extent, but it is chiefly due to lime.

2216. With regard to the question of hardness produced by other matters than chalk, are there not salts of iron which make the water very hard?—Yes; if we were to separate the other saline matters besides the calcareous matters; if we were to take the sulphate of soda, the sulphate of magnesia, or the nitrate of potash, or any such saline matters, perhaps we might arrive at the proportion of those which would be injurious; but I am directing my attention at the present moment to the proportion of carbonate of lime.

2217. *Chairman.*] Does not a careful examination of the water permanently drank by poor people, who drink a great quantity of water, enable you to say what quantity of lime in the water becomes injurious to health?—I cannot tell you that; I can only tell you that the largest quantity that water can take up is 92 grains per gallon, and that is a water which is drunk in considerable quantity without injury to health.

2218. Mr. *Clerk.*] There would, of course, be some inconvenience in the use of such water, as regards hardness for washing purposes?—Yes, and after some little time, after half an hour's exposure to the air it becomes milky, and has not a pleasant appearance.

2219. Is it not the case that animals drink with the greatest pleasure water containing a very large amount of carbonate of lime?—No; animals, generally speaking, are not fond of water containing carbonate of lime; and you will find that animals will rather drink water out of a dirty pool than they will drink hard water; take the case of Epsom; the race horses are not inclined to drink hard water; but I am directing my attention to the effect of such waters upon the human constitution.

2220. With regard to the presence of other matters in water, if you found an excess

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excess of salts, chloride of sodium, for example, that is a bad indication, is it not?—Yes, it is generally; there are exceptions to that rule, because some waters which are in the neighbourhood of the sea shore contain common salt to the extent of four or five grains, without being injurious or giving any indication that it is polluted; but when we have common salt in river waters in large quantity, and when we find common salt also in well waters, we are disposed to think that such common salt must have come from the secretions of the human body, the urine in all probability, and it is an indication, to some extent, of previous pollution; looking at these waters we find that the proportion of common salt is very small, it does not amount to two grains in any of them.

2221. The presence of that quantity can be no possible harm, I presume?—No; common salt is in itself harmless in those proportions; but it is a tell-tale, so to speak, of the sort of matters which may have got into the stream.

2222. That is, from things seen, you infer things unseen and unknown?—Just so.

2223. Mr. *Clerk.*] When you find that salt in a very small quantity, does it satisfy you that there can be no large amount of sewage intermixed with that water?—It does; it satisfies me to that extent.

2224. Now turning to Table No 3, that, I think, shows, does it not, an examination of the waters supplied by the different Metropolitan Water Companies during each month of the years 1865 and 1866?—Yes; it does.—(*The Witness delivered in the Table.*)—This table shows that the variation in the composition of any of the waters is but slight, it does not amount to two grains on either side of the average. We have more solids in the water in the months of January, February, November, and December, that is during the rainy months, than we have in the water during the months of July, August, and September, when there is but little rain; but the average proportion on either side is so small that it indicates that the waters are not of very variable composition.

Vide Appendix.

2225. The fluctuations are very much the same in each case?—They are pretty nearly the same.

2226. From two to three grains is the excess of the fluctuation?—Yes.

2227. That table shows the quantity of solid matter, and also the quantity of organic matter month by month during that year?—Yes; and it also shows the quantity of oxygen that is required to oxydise organic matter.

2228. That raises another issue, upon which there is some difference of opinion amongst chemists, is there not?—Yes.

2229. I think you have another table which shows the qualities of the waters supplied to the metropolis in the years 1851, 1856, and 1867?—Yes; that is shown in Table No. 4.—(*The Witness delivered in the Table.*)

Vide Appendix.

2230. That table shows, does it not, as you showed before with regard to the East London, the great improvement in all the metropolitan companies in the quality of the waters now supplied?—It does show some improvement between 1851 and 1856, and it has improved also between 1856 and 1867. All the samples were taken in the month of January, therefore they are fairly comparable.

2231. The Kent Company is also included here, showing the same improvement?—Yes, the Kent Company is there; the Kent Company has more solid matter per gallon, you will perceive, in the year 1867 than in the year 1856, but that is due to this, that they abandoned the River Ravensbourne, and are now taking deep well waters.

2232. And the organic matter, I may take it, is determined in the same way in 1851 and in 1867?—Yes, in all those cases the organic matter has been determined by the same process, namely, that of incineration.

2233. Do we arrive at this result in this table, that they will bear comparison with the waters supplied to most of the chief towns in Europe?—Yes, and I will put in Table No. 5, which, in a general way, shows that the waters supplied to most of the large towns in England will bear a comparison with most towns in Europe.—(*The Witness delivered in the Table.*)

Vide Appendix.

2234. You have these from very different formations; Birmingham is supplied from the red sandstone?—Yes.

2235. Guildford is from the green sand, is it not?—It is chalk water on the green

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green sand; it comes from both; there are different descriptions, down to lake waters; we have got the Loch Katrine waters at Glasgow, and a water similar to it on the other side of the Clyde.

2236. Some of those have a very small amount of solid matter per gallon, and some are soft waters?—Yes; we begin with Birmingham, which contains the largest proportion of solid matter per gallon; and we go down to Loch Katrine which contains the smallest proportion; and I have put in the last column the proportion in 1861 of the mortality for the purpose of getting at this, whether there could be seen any relation whatever between the mortality of a town and its water supply; the result is this, that the mortality is less in all the towns supplied with hard water than in any of the towns supplied with soft water; I do not mean to say that this is due to the water at all, but it is an indication that the water has nothing to do with the mortality.

2237. *Chairman.*] Have you classified those waters as hard and soft in the table?—As they go down in degrees of hardness, they pass down in degrees of solid matter; and then you will find under the degrees of hardness, if we take this indication as a sort of datum line, that above 10 degrees may be called a hard water, and below 10 degrees a soft water; you will find that in all the towns supplied with soft water the average mortality amounts to 26·1 per 1,000, whereas in the hard water districts it amounts to only 22·2.

2238. On the other hand, the occupations of the people in the towns in that table, and the conditions under which they labour, are not the same?—I am quite prepared to admit that; but Birmingham and Sheffield are two places with pretty nearly the same class of population; you will find the Birmingham water to be the hardest in this country; Sheffield is supplied with very soft water, which contains less than six grains per gallon, and the mortality in Birmingham is 24·4 per 1,000; but the mortality in Sheffield is 26·2 per 1,000; those are places quite comparable, but there are other causes; I am not putting that down to the water.

2239. Birmingham is on high ground, and Sheffield is on low ground, is it not?—To some extent, that is the case; Birmingham is well situated for drainage and many other circumstances; this table was drawn up for the purpose of getting at this, whether there could be found any relation between the health of towns and their water supply?

2240. Mr. *Clerk.*] You do not deduce any positive result?—No positive result beyond what may be termed a positive negative result; that is to say, it indicates that whatever it is, it has nothing whatever to do with the health of the towns.

2241. The metropolitan water is a sort of intermediate water, not what we call a hard water, although it is not a soft water?—No; taking the average of the towns of England which have waters over 10 degrees of hardness, we shall find that the average is 14·9, and the metropolitan water is 13.

2242. Mr. *Henry Baillie.*] What is the hardness of the Birmingham water?—The Birmingham water is 15½ degrees; the Leamington water and the Guildford water, 18½; the Southport water, 19½; the mortality in Southport is only 19 per 1,000; that is remarkable, because Southport is a place to which invalids go, and one would imagine that the mortality would be increased on that account.

2243. *Chairman.*] Have you any table of the sources of supply of those different waters?—No, I have not; that is a matter to which the engineers could speak better than I can.

2244. Mr. *Clerk.*] The Birmingham water is from the red sandstone, I believe?—Yes.

2245. And Leamington, also, is from the red sandstone?—I think it is.

2246. Is Guildford from the green sand?—Yes.

2247. It contains salts of iron, does it not?—To some extent, but not much; at Sunderland and South Shields, I do not remember what the formation is.

2248. Edinburgh is peaty water, taken from the hills?—Yes. Some of those are river waters; Wakefield, for example.

2249. Is Southport out of the red sandstone?—Yes; I have analysed that water often. There is this peculiarity about these waters, that you will find that all hard waters are clear waters, and sparkling waters, and pleasant to the taste, whereas it is the reverse with soft waters, so far as my experience goes. They are not generally bright; they have a peaty tint, and, to my mind, not a pleasant taste.

2250. Looking to that which is the great test of the quality of water, namely, the amount of organic matter, do the London waters compare well with the waters supplied to other large towns?—Yes; in the towns of over 10 degrees of hardness, the organic and other volatile matters are 1·37 grains, and the metropolitan water is 1·18.

2251. You are aware, I believe, that the question of the advantage of supplying a hard or a soft water to a town has been a good deal considered, both in France and in Austria?—Yes.

2252. I believe, a short time since, it was referred to a Commission of French chemists, to consider whether a hard water, or a soft water, was best adapted to supply Paris?—Yes, that was so.

2253. And, I believe, that the Commission rejected the soft water, and chose a water very similar in its composition to that now supplied to London?—Yes; I have been examining the Paris waters within the last fortnight, and I find that the new Paris water is very similar to the New River water. That is the water which has been selected by the Commission appointed to inquire into the best source of supply for the City of Paris, and they have selected that in preference to a very soft water which they might have obtained from a granite district; and they have selected it because they consider that the water supplied to a large city should possess certain qualities which a soft water rarely or never possesses.

2254. Where does it come from?—It comes from a chalk just in the same manner as all the water for London comes from the chalk. The New River water, and the River Lea water, are all in reality chalk waters, but they have become softer a little by passing in open channels.

2255. Mr. *Clerk.*] Is the new Paris water brought from near Chalons-sur-Marne?—Yes, I can give the particulars if necessary; that is a large chalk district.

2256. Mr. *Henry Baillie.*] Do not they use the water from the Seine?—They use the water of the Seine to some extent; they pump a little at Chaillu, and also just on the opposite side; but they are now little by little abandoning the Seine water, and they are taking these chalk waters which are being brought into Paris. In the course of a few years they will have nothing but this chalk water. They are giving up the Seine water that they may have this, which they consider better water.

2257. Have they an abundant supply?—Yes; they expect to obtain a supply of 30 gallons per head.

2258. Mr. *Kekewich.*] From what distance do they bring those waters?—Some of them a very long distance.

2259. Mr. *Clerk.*] Is it between Chalons and Epernay that they bring them?—Yes.

2260. This map will show you the line of the water that they are giving (*handing a map to the Witness*)?—I do not think that this gives the distances that I could measure. I do not know what the distances are upon this map, but it is a long distance.

2261. Then again at Vienna there has been a Commission, has there not, to inquire into the best water for Vienna?—Yes, and very recently. I have received from Vienna the report of the Commission upon the subject.

2262. What description of water have the Commission reported in favour of?—They have reported in favour of a supply of rather hard water; a water that is not very different from the water that is supplied to this metropolis; and they have reported upon nearly the same grounds as the French. They have examined and selected water from 10 to 18 degrees of hardness, and they say that water of 12·6 degrees of hardness is not objectionable, and that it is of prime consideration that in supplying a city which uses the water for drinking purposes it should be bright and clear and well aërated.

2263. *Chairman.*] Where have they taken it from?—I have not got a note of that.

2264. Mr. *Clerk.*] They report in favour of a water of a certain degree of hardness?

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hardness?—Yes, they have made a selection of a water with from 10 to 18 degrees of solid matter per gallon.

2265. What are the general characteristics of a hard water which, in your opinion, would render it the better adapted for the supply of a town?—In the first place, it is generally bright, clear, and well aërated water; it is agreeable to the eye and to the palate. In the next place, it is not supposed to absorb foul gases; it is already so charged with gases that it has little or no tendency to take in other gases. It is not liable to putrefaction, and the organic matter is so small, and is preserved in it to a greater extent than it would be if it were soft water.

2266. Then it has no chemical action upon lead or iron pipes?—No, that is another good property, that it has not any tendency to act upon lead, for although soft waters may not acquire a poisonous property by reason of their being brought into contact with lead, yet we know unquestionably that soft waters do act upon lead; I believe that to some extent there is a risk in that respect.

2267. As you have already observed, there is one objection taken to the use of hard water, that it is not so good for washing as soft water; but still, by the time it is reduced to the state in which water is used for washing, it loses a great amount of that hardness which renders it objectionable for washing?—Yes, though the waters supplied to London have a primitive hardness of 13½ degrees, yet when they are raised to the boiling point the hardness falls to 11·2 degrees, and, by boiling water for five minutes, the hardness is reduced to 9·3 degrees; for a quarter of an hour to 4·4 degrees, for half an hour to 2·6, and for an hour to 2·4; you will not find in any kitchen boiler in London a water harder than 5 degrees of hardness.

2268. Are those degrees tested by what is called Dr. Clark's test?—Yes.

2269. A crust is deposited, is there not, from time to time, from the use of hard water?—Yes, that is the chief objection to hard water; but the calcareous matter which gives hardness to the water, if the water becomes soft by boiling, must be deposited, and is deposited.

2270. In the London waters, is that carbonate of lime which is easily removed?—Yes; almost all the crust which is deposited in a boiler from London water, is a carbonate of lime crust; it is not adherent to any great extent, it is very easily removed from the boiler, and it differs very considerably in its texture and firmness from the crust formed from sulphate of lime or salinitic water.

2271. In the year 1851 there were certain chemical commissioners appointed, were there not; Dr. Hofmann, Dr. Miller, and Professor Graham?—Yes.

2272. Did they not report with regard to what extent carbonate of lime might be contained in water, and yet that water remain wholesome?—Yes; they reported that a water containing 92 grains of carbonate of lime, and from 30 to 90 degrees of hardness might be taken without any injury to health: that represents the same proportion of carbonate of lime, or its equivalent, it may be sulphate, in the water.

2273. That was the opinion of English chemists; all men of first-rate celebrity, are they not?—Yes.

2274. I believe the French Commissioners also reported that a hard water seemed to be more salubrious than a soft water?—Yes; I do not go altogether so far as they do in the matter; they came to the conclusion that hard waters were really beneficial; that fewer conscripts were rejected coming from a hard water district than from a soft water district, and they thought that the calcareous matter was probably food, and was necessary for the development of the tissues; that was a consideration which weighed very much with them in the selection of hard water for the supply of Paris. I will beg leave to hand in a Table showing the composition of the waters of the pumps and surface wells of the City of London.

Vide Appendix.

2275. There was a process patented by Dr. Clark, of Aberdeen, was there not, for removing carbonate of lime from water?—There was a patent in the year 1841.

2276. That has not proved successful when used upon a large scale, I believe?—No, as far as I know it has never been used on a larger scale than it was used at Plumstead; and there they softened not much more than 600,000 gallons a day; the difficulties in the way of its application on a large scale are very great.

2277. You

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2277. You have made a great many calculations with regard to the use of animal charcoal?—Yes.

2278. Mr. *Cripps.*] I can only say on behalf of the parties whom I represent, that I shall not think it necessary to ask Dr. Letheby a single question upon that point; we do not go into this question at all, nor do I see how it bears upon the Act of 1852.

2279. Mr. *Clerk.*] In the course of your experiments, I believe you had to examine the state of the sand after the filtering process had gone on by the different companies?—Yes, at the time of our visit to the companies' works, we made a very careful examination of the manner in which the water was filtered; we found that filtration was effected, generally speaking, through three feet of very fine sand and then through coarser sand, and I was curious to know, not only from an analysis of the water before filtration and after filtration, what was taken out of the water, but also by an analysis of the sand to ascertain whether it was practically an efficient agent for the purification of water, and I had samples of the sand as taken from the filter beds, and the sand when washed and ready to be put back again; and the analysis of the sand and the experiment show that a very considerable portion of organic matter is taken from the water by the filtration of the water through the sand.

2280. Mr. *Bailie.*] How do they cleanse those filtering beds?—They have always reserve filter beds, and as soon as a filter bed gets what may be termed foul, and ceases, perhaps, to pass water as freely as it should, that bed is thrown out of use, and the foulness is found upon the immediate surface of the sand; that is taken off, going down to such a depth as the colour would indicate the presence of impurity, and that is then well washed, and the sand is in a condition to be put again on the filter, and to carry on the operation a second time.

2281. They must renew the sand from time to time?—Yes, the sand breaks up, and I believe it is an item of some importance in the expense of the Water Companies, the renewing of this sand.

2282. Mr. *Headlam.*] Does the water ever flow over the bed of sand?—No, through it; it passes through three feet, at least.

2283. And the impurity is always left on the surface?—Generally the impurity is physically suspended; it is suspended matter in the water, and it will not pass through the fine apertures between the sand.

2284. Mr. *Clerk.*] On the surface there are two or three feet of fine sand?—Yes.

2285. That fine sand intercepts the passage of the impurities?—Of the grosser impurities of the water; that is to say, matters which are suspended in the water.

2286. Under that, there is a course of coarser sand for about a foot?—Yes, somewhere about a foot; it varies in some places to 18 inches or more.

2287. Are there layers of still coarser sand?—Yes.

2288. The matters which are held in suspension are removed, are they not, by the passage through the finer sand?—Yes, that varies with the filter.

2289. And after a short time, I believe, you have a vegetable growth?—That happens in summer time, when there is a good deal of vegetable growth; there is a particular weed which we call silk weed, which grows very rapidly upon the filter beds in the summer time, and which is found to stop the pores of the sand, causing a difficulty in the filtration of the water during the summer time, and necessitating the cleansing of the beds more frequently than at other times; indeed, if it were not that the matter were stopped at the very surface of the sand the filtration of 100,000,000 gallons of water taken in the metropolis would be almost impracticable; but from the circumstance that it is stopped at the top of the filter bed, the sand can be easily taken off and washed and put back again; it is an operation without any practical difficulty, but if the whole of the sand had to be replaced, if the fouling went right through the whole body, I do not know how the operation could be conducted.

2290. The organic matters in suspension being stopped by the finer sand when that is taken off and washed, the sand is restored to the state it was in, or very nearly, when it was originally put down?—Yes, excepting that it contains a little more carbonate of lime than it originally contained, which has no doubt been aggregated from the water, and which has tended to soften the water.

2291. You found it reduced from 2·7 per cent. in the unwashed sand of organic matter to the point of 0·8?—Yes, in one of the companies' works; and in

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in the other I found that the organic matter in the sand was reduced from 2·1 to ·09.

2292. I believe in the course of last year it was referred to you by the Commissioners of Sewers for the City of London, to make a report with regard to certain matters connected with the supply of water to the City?—Yes.

2293. And amongst other matters, I believe your attention was drawn to the system of constant supply, was it not?—My attention was drawn to it in consequence of a circular from the Metropolitan Board of Works, I suppose, to all the local authorities, asking for information upon certain points; I was therefore requested by the Commissioners to supply that information and to report on the subject, and I did so, and I have the report here.

2294. As the medical officer for the City of London of course your attention has long been turned to the question of the supply of water to the poorer inhabitants?—Yes.

2295. And the having a constant supply of water has always appeared a matter of the greatest advantage to those poorer classes who are under your supervision?—I am not an advocate for water within the houses of the poorer classes, but there can be no doubt that a constant supply of water, easily accessible to the poor, would be a matter of very great importance.

Vide Appendix.

2296. Will you hand in that report?—(*The Witness handed in the Paper.*)

2297. You also have a list of places where a number of pumps have been got rid of, and a vast number of stand-pipes put up in their place?—Yes.

[*The Witness delivered in the following Table*:—]

List of Places in the City of London where a constant supply of Water from the New River or East London Water Companies' Mains has been furnished through Standpipes, for the Service of Houses in the occupation of the Poor.

STAND-PIPES WITH "WASTE PREVENTERS,"

In lieu of City Pumps.

Aldgate.
Aldgate High-street.
Cock-and-Hoop-yard, Houndsditch.
Bishopsgate-street, by Dunning's-alley.
Creechurch-lane, Leadenhall-street.
Half-Moon-passage, Gracechurch-street.
Leadenhall Market.
Minories.
Milton-street, Cripplegate.
Mitre-square.
Newgate-market.

Other Courts.

Three-King-court, Minories.
Maidenhead-court, Moor-lane.
Bridgewater-place, Fann-street.
Plough-court, Fetter-lane.
Holborn-buildings.
Montague-court.
Sharp's-court.

Stand-Pipes with "Self-Closing Taps."

Gravel-lane.
Hutchinson-street or Avenue.
Stoney-lane.
Middlesex-street.
Petticoat-square.
Harrow-alley.
Widegate-street.
Artillery-lane.
Cutler-street.

Total - - - - 27.

2298. In your experience, as medical officer of the City of London, have you found that there is the greatest difficulty in getting the owners of property to comply with the requirements of the Act of 1852, in putting their houses into such a condition as to receive a constant supply?—Very great difficulty; and, indeed, with the exception of a few houses in the East of London, I know of no house even in the City of London where there is a constant supply; the houses are not in such a condition as will admit of the reception of a constant supply.

2299. Without such arrangements being made on the part of house-owners to receive the constant supply, would the constant supply be really injurious to a great deal of this property if it were now given, by making houses damp and having them flooded?—Yes, that is very likely to happen if the fittings are not in a condition to prevent the escape of water; and I know they are not in a condition to prevent the escape of water, because when the water is on, I see them leaking in all directions, and that constantly going on must necessarily produce dampness about the place which would be injurious to health.

2300. Mr. *Kekewich.*] That may always be remedied by a ball-cock, may it not?—It may to some extent, but poor people's houses very rarely admit of a ball-cock. Property of that description is so little respected that I know, as a matter of experience, that although I may to-day order a landlord to put the fittings in the proper condition, and have a ball-tap to the cistern to prevent the waste of water and leakage, immediately it is done it is stolen; and the practical difficulties in the way of meeting that case in the houses of the poor is such that I really do not know how to deal with it.

2301. Mr. *Clerk.*] On behalf of my learned friend, Mr. Johnson, I will ask you a few questions with regard to the Kent Water Company. You have examined the Kent water, I believe?—Yes; I have regularly done so since the year 1863.

2302. You have made some careful analyses of the water supplied by the Kent Company?—Yes.

2303. I believe that the waters supplied by that company are kept free from the least trace of anything like sewage contamination?—No; that water is so free from organic matter that when it is looked at in a very long glass tube it is nearly blue. It is like distilled water in that respect; nevertheless, it gives off a great deal by incineration occasionally, but it is no indication of organic matter.

2304. When examined by permanganate of potass, which always detects the presence of organic matter, does it show very little of an oxydisable character?—Very little indeed.

2305. The average amount of organic matter in the Kent water for the last 12 months, I believe, has not exceeded one-tenth of a grain per gallon?—In 1867 I made out a table showing the composition of the Kent water, it is about two-tenths of a grain; that is in Table No. 4.

2306. Can you hand in any table similar to No. 1 and 2 showing an analysis of the Kent water?—Yes; I will furnish tables of the Kent waters month by month as represented in Tables No. 1 and 2.

2307. I believe the water supplied by the Kent Company is particularly wholesome water?—Yes.

2308. It is rather a hard water, having a good deal of carbonate of lime in it? —Yes.

2309. Boiling, of course, reduces that considerably?—Yes.

2310. Can you tell me how much boiling reduces the hardness of the water? —It reduces it to about five and a half or from that to six degrees; the quantity of carbonate of lime in the Kent water averaged from 13 to 14 grains per gallon—that is, carbonate of lime; and there are between five and six grains of sulphate of lime per gallon in addition.

2311. From your analyses your opinion is that the Kent water compares very favourably with any of the water, supplied in London?—Yes, I say the only objection to the Kent water is that it is a hard water.

2312. It has a great tendency to deposit in boiling?—Yes, in every other respect it is a good water.

2313. Mr. *Kekewich.*] I dare say you are aware that the water which flows out of limestone or gravel has very fertilising qualities, but that the water which comes out of clay has not—I mean for purposes of irrigation?--Yes.

2314. Is it more or less wholesome in a sanitary point of view?—I should think the waters coming from a chalk and a limestone district are more wholesome than waters coming from the clay; the waters coming from the clay are insipid, and may really be expressed by the word coldwaters, unpleasant water.

2315. They have no fertilising properties?—Not always; their fertilising qualities they owe to the presence of nitrates, and with regard to some of the lower green sand waters, which contain nitrates, confervæ grow in those waters almost immediately after issuing from the spring, and these are matters we find very great difficulty in dealing with.

Cross-examined by Mr. *Cripps.*

2316. You have been asked recently about the constant supply, and I understood you to say that as an abstract question, you think that the constant supply is a very great advantage?—Yes, I think that if the constant supply could be regulated

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regulated in such a manner as that all the contrivances and appliances were kept in proper order, the constant supply would be a boon to the inhabitants; but I mean a constant supply of this description; I do not think the constant supply, without the presence of cisterns, would be an advantage.

2317. And especially with regard to the poorer class of houses you would abolish the butts?—There can be no question that the constant supply in those public courts and alleys for the poor would be a very great advantage.

2318. In your report you express your opinion that nothing could be easier than to obtain a constant supply, if it were really wished for, under a specified legal process for obtaining it; your words are, "What could be easier, if a constant supply were really desired, than the specified legal process for obtaining it"; what would be your notion of that?—It is to follow the directions of the Act of Parliament.

2319. First, what would have to be done?—Four-fifths of the inhabitants must sign a paper to the effect that they wish for the constant supply.

2320. First of all, you must get four-fifths of whom?—Of the inhabitants of the district receiving the supply, I suppose, from the main.

2321. What do you understand by that?—That is the question of the Act of Parliament.

2322. In your opinion, nothing could be easier; I want to know how it could be done?—It is clause 15 to which I refer; I studied this at the time when I wrote that report; there may be legal difficulties, and I am very well aware that lawyers would look at it from a very different point of view from what I do; but it seemed to me that in framing this Act of Parliament, Parliament very carefully provided for a constant supply if the consumers wanted it; but if you see legal difficulties in the way, that is another point.

2323. First of all, have you any idea as to the four-fifths, what number of persons that would be?—The owners or occupiers of houses on such main.

2324. Have you made up your mind as to what that is?—I do not know what a division of the district may be.

2325. Would that be enough of itself, supposing four-fifths agreed, and then sought for a constant supply; would that do?—No; then there comes another difficulty, which difficulty is whether the fittings are in proper order.

2326. No; long before you get to the fittings there is another difficulty; what might the dissentient one-fourth do, or the one-fifth, if the fittings of the dissentient party are not in order, then that would stop it?—Yes.

2327. It is not the fittings, generally, but those that dissent?—The fittings of the whole district is the first thing to be considered; the whole district itself must be put into order first; the next is, that if one-fifth object, and their fittings are not in condition, the water company need not supply.

2328. And will it do then; may they not after that suspend the giving of it?—Very likely; I do not remember.

2329. Do you think it is very easy to begin with, to get four-fifths of your neighbours in any large district to agree about a matter of that kind which might be an expense to them?—No doubt. I will answer the question first by the impression upon my mind. I say there would be difficulty, no doubt; but the difficulty only indicates that the public do not seem to care about a constant supply.

2330. It is a question of how much trouble individuals will take, but a good deal of trouble must be taken as you are well aware, in London, to organise a party of this kind to adopt an Act?—Yes, in these questions which probably may be matters of difference of opinion there is that difficulty, but if the constant supply were a crying necessity, I think you would find four-fifths of the people asking for it.

2331. Now with regard to another matter, you spoke of the difficulty of obviating the waste, have you ever had any experience of any place where there is the constant supply?—Yes; I know several towns in England where there is the constant supply; I know pretty well Norwich and Nottingham.

2332. Do you find that the parties there would prefer to have the intermittent supply instead, or are they satisfied with the constant supply?—I believe they are all satisfied with the constant supply.

2333. Is there any greater difficulty in your opinion in London than there would be in any other towns in which it has been adopted?—There would not have been originally so much difficulty, but at the present time the difficulty is very great; you have to overturn the old system and bring about a new condition of things, and that is a great difficulty; I find it to be so in any movement of what may be termed reform, no matter what it is, with regard to the sanitary condition of a place; you have had great difficulties in altering the condition of things.

2334. You do not stop sanitary improvements, do you, because you find difficulties in making changes?—We unfortunately are compelled to do so at once.

2335. And it is very undesirable when you are stopped in that way?—These matters no doubt require a great deal of consideration; there are always two sides to a question; and I know this, with regard to the sanitary improvement question, if I were to ask a landlord to do that which I considered absolutely necessary to supply his poor tenants with water, and he does it; nevertheless, if I find within a week that the tenants' appliances are deranged by the almost wilful wickedness of the tenant, I say then, what am I to do; am I again to ask the man to put things in order? So that we are really stopped in our sanitary reforms.

2336. Do you suppose that people are more wicked in London than elsewhere?—I am afraid they are, from what I see.

Re-examined by Mr. *Clerk.*

2337. I am afraid that in the City of London you do not find the local authorities take up this sanitary question very much, of the supply of houses with the constant service?—No, I do not; but even if they were to do so, the landlords would object to laying out the money necessary for the constant supply.

2338. My learned friend asked you whether you would stop sanitary improvements because there is a difficulty; does it appear to you that the water companies are the persons who are to be at the expense of adopting sanitary improvements, and that they are to be the active parties in introducing all those sanitary measures?—I should think not; I should have thought, with regard to that matter, that either the local authorities, or the public, should bear the expense, to a large extent, at any rate.

2339. I believe that in the East of London, as you have already mentioned, there are two water companies that are quite ready, whenever circumstances will admit of it, to give the constant supply?—I have always found it so. When we wished, during the time of the cholera, to abolish the city pumps, we found it necessary to supply water to the whole of those districts, and we applied to the New River Company and the East London Company to supply them with a constant supply in those districts, and they did so with the provision that there should be some instrument to prevent waste.

2340. The East London Company have got over one of those difficulties, have they not, about requiring the whole of the parishes on a main to have their fittings in a proper condition to receive the constant supply, by giving a limited supply by means of diminishing the aperture?—Yes, through a ferrule.

2341. And that, as you know, is done to 25 per cent. on the whole district?—So I am told.

2342. *Chairman.*] Can you explain the great variations that there are in Table No. 2, for example, in comparing the waters supplied by the different companies; some of those elements of impurities appear to increase, and to be greater in the mains than they were when unfiltered, and sometimes they are less, and in not one of those analyses can you refer anything, or does it appear possible to refer anything to any general rules?—No, because here we are not experimenting upon the same water before filtration and after filtration. Many days, as you perceive by the dates, have elapsed between taking the one sample and taking the other; those variations are really not very great, but nevertheless those variations are due, not to any differences in quality, nor perhaps in respect of any particular constituent as brought about by the filtration, so much as to the differences inherent in the water, from its being taken on different days.

2343. So that each must be regarded merely as a positive analysis, without reference to any other?—Yes; the water of the Thames to-day will show a different quality from the water taken on Saturday from the flood waters that have got into it, and those other little differences which come about within a few days; we have not in this table made an examination of the same waters; it

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it is, in fact, difficult to do it; you can only arrive at conclusions from a large number of investigations, getting a good basis, as it were, for generalisation, and that is done in the other table.

2344. Can you explain why there is so much organic matter in the Kent water?—There is very little organic matter indeed in the Kent water; but that which is put down here under the name of organic and other volatile matter, determined by incineration, is other than organic matter and volatile matter which is contained in the Kent water; nitrates are present in the Kent water, and oxydised nitrates would be given off during the progress of incineration; and that loss is put down there under the head of organic and other volatile matters; it does not actually represent the total soluble organic matter; it represents other things; in fact, at the present time we have no positive test for the discovery of the proportion of organic matter.

2345. Then as regards this table, that water would appear to be in precisely the same condition as other waters?—Very nearly; in fact it would seem to be worse than the New River water, but that is dependent upon this, that the Kent water contains more nitrates than the New River water, and it loses more, but those nitrates are not organic, there are other substances which are driven off by the application of heat.

2346. Do you know what is the average quantity of water consumed by a person daily?—Yes; we have had some very careful investigations made for the purpose of arriving at that. In 1852 some inquiries were made in the City of London very carefully by Mr. Haywood, and my predecessor, Mr. Simon, for the purpose of ascertaining what quantity of water should be supplied per room of a house in the poorer districts, for those houses which come under the denomination of the common lodging-houses of the City differing from the common lodging houses outside the City. The investigations led to this, that the first-class houses, with from 12 to 20 rooms, and with very good cisternage, and water-closets and baths, consume 12·87 gallons per head; the second-class houses, with good cisternage, consumed 7·41 gallons per head; the third-class houses of the poor, with bad receptacles, consumed 3·65 gallons per head; our model lodging-houses consumed 6·5 gallons per head; in the courts and alleys where there were stand-pipes, and no other water supplied to the houses, the quantity consumed was 5·1 gallons per head. And then we take the workhouses, where there was probably care used to prevent waste, and we found that in St. Martin's Workhouse the quantity of water consumed per head was 3·68 gallons per day; in Clerkenwell Workhouse the quantity consumed was 3·1 gallons per head per day; and in the Holborn Union Workhouse 5 gallons per head per day. We therefore concluded that 6 gallons was a good amount per head, and as the average of the City showed in those houses four people in a room, we laid down the rule that 2·4 gallons of water per room should be delivered in the four districts.

2347. Did you examine further what was the nature of that consumption, how much was due actually to food, and how much for other purposes?—No, that is a very difficult thing to arrive at. If we take the first-class houses, we find in round numbers 13 gallons per head used, and in the poorer houses 5 gallons per head used; the difference then of 8 gallons must be due to the use of it in water-closets and for baths, and probably for greater cleanliness and so on, than is followed in the poorer houses.

2348. You cannot tell us exactly what is considered to be the consumption for food per head?—No, I do not know any data for that; the quantity of water that is passed away from an individual per day amounts pretty nearly to a pint and a half, or from that to a quart, and, perhaps we might say, that no more than that, at any rate, is drunk; the quantity used for cooking and washing again is very difficult to arrive at.

2349. Do you consider that the quantity of those mineral matters in the water is not such as to have any influence on the health, supposing a person to drink a quart a day, which, I suppose, would be very little?—I am certain they are not injurious to health.

2350. Not any of them?—Not any of them.

2351. Nor the combinations of them?—No, not in any way.

2352. You do not know what the organic matter is, I suppose?—No, we do not.

2353. If it were ordinary vegetable matter, could it be injurious to health?—

Not

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Not in that proportion; I do not think that, in that proportion, vegetable matter in water would be injurious; supposing it were peaty matter it would give the water a dark colour, in fact, one-tenth of a grain of peat matter in water would give that water almost the tint of ale, but, as far as I know, it is not injurious to health, but if it were animal organic matter, in a state of putrescence, there is every probability or certainty, it is possible, that it would be injurious to health.

2354. Mr. *Headlam.*] Is not peaty water injurious to health?—No, not when the peaty water does not go to more than two-tenths or four-tenths of a grain per gallon, and that would give to the water a very distinct peaty colour and flavour; but when it gets more tinted than that, it has the effect upon some people of producing diarrhœa and dysentery.

2355. *Chairman.*] There are other matters in water which are not, I believe, appreciated in any chemical analysis, are there not?—Yes, there may be.

2356. And those may be injurious to health?—They may be; we know nothing of what the cholera germ is.

2357. Or any other germ?—No, nor any other germ; the germ of that class of diseases may be in water without our being able to recognise it.

2358. You cannot by chemical analysis detect the presence of those things which you can see by a microscope?—No, not in small quantities of that kind you cannot, but if living organic matter were there in any large quantity, it would be discoverable by chemical means; but the proportion which would stand at the bottom of a gallon of water, and which would be discovered by a miscroscope could not be discovered by chemical means.

2359. That is to say, if you could remove the vegetable impurities by filtration, you could see by the microscope what could not be discovered by chemical analysis?—That which is present in the water and which is discoverable by the microscope after filtration, has, in all probability, come into the water since the filtration has been effected, probably animalculæ and confervoid matters which have grown in the water; if the water has been well filtered, you need not fear the presence of those creatures in such quantities as to be discoverable by the microscope.

2360. What I mean is this: there may be a great many things present in water that you could discover by the microscope, which you could not find out by any process of chemical analysis?—Yes, that may be so.

2361. Therefore, in point of fact, a chemical analysis is no criterion of the healthiness of water, as regards certain matters which may be present in it?—Yes, it is; you are going a little too far in assuming that those animalculæ which you see in water are injurious to health; we have no evidence that they are injurious to health.

2362. Some of them may be the bearers of cholera or other specific diseases?—That is an assumption which we know nothing about at the present moment; we do not know what the cholera germ is.

2363. Is it not an assumption of the faculty at the present moment that a great many diseases are transmitted by animals of some kind or other?—Yes, that is so. It has been thought that flies carried the rinderpest.

2364. Therefore all those animals which may be seen through a microscope, may be present without your detecting them by chemical analysis?—I can agree to that, but I cannot agree that those animals are the carriers of the cholera germ.

2365. As far as you know, they may be?—I do not know what the cholera germ is.

2366. You do not agree with the theory that specific diseases are transmitted by a specific kind of infusoria?—No, not infusoria. Specific diseases are transmitted by specific agencies, but whether those specific agencies are living germs or matters in a state of decomposition, we cannot say, and still less can we say that they are conveyed by infusorial animals.

2367. Assuming that the matter, at all events, is animal or vegetable matter, it would then be represented by this grain, or whatever it is, of organic matter?—It would.

2368. The characteristic of which we know nothing?—We know nothing about it.

2369. Therefore we are very far off from arriving at a conclusion?—That is quite

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quite true; we have not at the present time any absolute test for discovering organic matters in water, and much less the nature of those organic matters.

2370. But it is supposed that those known substances if infused into water when taken continuously, will produce deterioration or alteration of health? I do not know of any experiments that have been made upon that question for the purpose of determining it.

2371. Are there not chemical substances of which half a grain or a quarter of a grain taken every day would produce a serious effect upon health?—Yes, there is an acid called pycric acid, which may exist in water in a very small proportion indeed, and may not even tint the water, nevertheless it shall give to it a very distinct bitter taste, and it shall affect the nerves of sensation in that way; and there may be other things in an equally small proportion which may affect the system and produce disease; but I cannot answer the question as to what is the smallest quantity of any particular matter that would be capable of producing any injurious effect. Strychnia, again, may be put into water, provided it is not converted into a salt; but in its free condition strychnia will give to water a bitter taste when there is a very minute quantity indeed in the water.

2372. What are the smallest doses of strychnia which are now given by medical men?—Homeopathists give the decilliary part of a grain.

2373. What will the faculty condescend to?—They will condescend to the sixteenth of a grain of some things, which will produce a notable effect upon the system.

2374. And, if taken continuously, would it produce serious derangement?—Sometimes that is so.

2375. Could the sixteenth of a grain be detected by chemical analysis?—Yes, we can detect ammonia in water when the quantity of ammonia in the water does not amount to anything like that. It is calculated out in one of these tables which I have handed in.

2376. I see the thousandth part of a grain mentioned?—That is one part of ammonia in 70,000,000 parts of water; and that is very easily discoverable; but I do not think that ammonia by any physiological test may be discoverable. Then you may go the other way and say that there are probably forms of matter which are not discoverable by chemical means; but, nevertheless, they would be physiologically or pathologically active.

2377. Vegetable substances you cannot detect, I believe?—We cannot distinguish absolutely vegetable from animal substances in water, unless they are in so large a quantity as to be able to show us their marked properties, when they can be tested, but, under common everyday circumstances, of organic matter in water we cannot say whether it is vegetable or animal organic matter.

2378. What is the smallest quantity of vegetable poison now known which could be administered, a perceptible dose to produce an effect upon the system?—Take the active principle of belladonna—I forget what the specific quantity is—but a single drop of belladonna put upon the eye, will at once produce its effect by dilating the pupil, when probably there is not the thousandth part of a grain absorbed into the system.

2379. You cannot say whether the organic matter which you detect in water is vegetable or animal?—No.

2380. And it is not capable of being reduced to a mineral, I suppose?—We can detect organic matter, but we cannot say, unless it is in a large proportion, and shows its properties distinctly, whether it is vegetable or animal in its qualities.

2381. I suppose you are prepared to recommend that we should intercept from the water as much as possible, in future, the drainage of towns?—Yes; there is no doubt that the present system of discharging the sewage of towns into rivers is a very improper system, although the water has a very wonderful power of self purification when it is exposed freely to the atmosphere over a run of seven or eight miles; take, for instance, common sewage going into 20 times its bulk of good river water, in the course of a run of seven or eight miles, it becomes so purified that nothing of sewage can be discovered in it by chemical means, and such water may be used under ordinary circumstances for domestic supply for years and years without any injurious effect being perceived.

2382. Mr. *Benyon.*] You said that in the East London district there was about 25 per cent. that receive a constant supply now?—I believe it is so, by means of a graduated ferrule; the constant supply is not of this description, that they are able to go to the tap and draw as much as they like from the mains; but it is a constant supply, whereby there is delivered into the cistern a quantity in the course of 24 hours which would be equal to the quantity under common circumstances that would be delivered while the water was turned on.

2383. Are those houses new houses?—No; there are new as well as old; I believe that many of them are new houses.

2384. Does not that militate against your opinion, that a great objection would be raised in the old houses to adopting the system in consequence of the expense of adapting the fittings to the constant supply?—In the new houses, where the arrangements are made with a view to a constant supply, there is no doubt that it may be applied much more cheaply than in an old house, where the whole of the fittings must be re-arranged; I believe an estimate has been given to you by the engineer of the East London Company as to the average price of altering from the old system to the constant.

2385. Lord *Frederick Cavendish.*] Have you seen Captain Tyler's Report?—I have heard it read.

2386. He states towards the end of his report, "The most satisfactory, if not the only mode by which the inestimable benefit of constant supply could now be afforded to the metropolis would be, in my opinion, by making it incumbent upon the water companies to prepare for it within a reasonable period, by giving them power to put all necessary fittings into the houses for the purpose, and by permitting them to levy a fair extra rate for the cost and maintenance of such fittings. The owner or occupiers might choose from a schedule of prices the class of fittings as were required, for which they desired to be rated, and they would be served better and more cheaply in this manner than they are at present, when each man has to employ his own plumber. It would be to the direct interest of the company to erect and maintain good fittings, so as to avoid waste; and constant service, with convenient arrangements, and a minimum of waste, would be to the advantage of all parties. Second, only to improved dwellings a legislative enactment carrying out such provisions would be the greatest blessing that could be bestowed upon the working classes and the poor of London." Do you agree generally with that recommendation?—I agree generally with the recommendation; but it appears to me that it would be throwing upon the water companies a very much larger duty to perform than perhaps they would be enabled to accomplish. In the next place it is contrary, as far as I can perceive, to the spirit of legislation on such subjects, that private trades, so to speak, in any particular department of industry, should be taken away from the public and handed over to a public company. What would the plumbers, for example, in the whole of this district say, if all the plumbing operations were to be carried on by the public company?

2387. Colonel *Hogg.*] That has been tried, has it not?—I know that it has, and I know that there are towns in England where the gas companies are the gas fitters of the district, but it is another thing when it comes to be applied to the metropolis.

2388. The system was given up, was it not, in the cases to which you allude?—Yes.

2389. Lord *Frederick Cavendish.*] The companies would have a right to charge an extra rate, therefore, the occupiers would be still able to employ their own plumbers?—As an abstract principle it is all right, but it would be a very difficult thing to carry out in practice. You would find considerable difficulties in the way of the execution of it, if it rested with the companies to perform it.

2390. We are met with difficulties on every side, are we not, with regard to this question of a constant supply?—No doubt.

2391. And this might be one means of overcoming them, might it not?—It would; but the question is whether you are not creating greater difficulties than we have already had to overcome in the adoption of the constant supply.

2392. *Chairman.*] Have you made any inquiries into the condition of water in the cistern, or after it has been in the cistern for some time, as compared with the water as it is supplied from the mains?—Yes, I have.

2393. Will you state what the results of those inquiries have been?—Very frequently the water is much contaminated by matters which have either fallen into the cistern, or have entered the service pipe which delivers the water from the main to the cistern; I may give an example of what happened some 10

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days ago; some water was put into my hands for examination, received from a cistern in one of the houses in the City, and I found it largely charged with drainage impurity, and upon inquiry I found that one of the service pipes which carried the water from the main to the cistern passed through a dung-heap, and a little hole had been made in the pipe by oxydisation, and the drainings of the stable manure had entered that pipe, and every time that this water was delivered to the cistern, that which had oozed into the pipe was delivered into the cistern; I have found dead animals frequently in the cisterns of the poor, and the water often charged with decomposing organic matters.

2394. Have you found much accumulation of dirt generally in cisterns?—Almost always; the bottoms of the cisterns of all poor people's houses, unless they are cleansed about every month or six weeks, have a deposit of filthy matter; generally speaking the cisterns are uncovered, and they are placed in situations admitting of the access of filth of all description.

2395. Colonel *Hogg.*] They could be easily covered, could they not?—They would take the covers away immediately, and chop them up for firewood; we do not know how to deal with those cases.

2396. *Chairman.*] Those matters falling from the atmosphere in London into a cistern do much injury, do they not?—Not very much; I have examined the rain falling in London, and also snow, and we find there is a good deal of carbonic matter in it, but that would not pollute the water to any great extent; that which goes into the cistern is generally grosser matters than that.

2397. With the blacks and dust of London constantly falling into a cistern, do you not think that their accumulation must injure the water?—Yes; over a long period of time it would form an accumulation at the bottom of the cistern, but not in the course of a moderate time; in the course of a month or six weeks I believe it would not.

2398. Is it your opinion generally, that there is a great indisposition on the part of people to keep their cisterns clean and in good order?—There is no doubt of it.

2399. What remedy would you provide for that?—I should like to see the cisterns in the whole of those houses done away with altogether, except those supplying closets, and I would have stand-pipes placed in a court or alley, and have some contrivances by which the waste might be prevented in the yard or in the house itself.

2400. Do you think that a stand-pipe would have fair play if it were not in the house itself?—Yes it would.

2401. Do you think that they would turn it off?—There should be a contrivance which would only admit of a certain quantity of water being drawn at a time; there are stand-pipes so constructed, that by turning a tap on to let the water run into a pail you turn it off from the main, and you only receive from that stand-pipe the water contained in its chamber, about two, three, or four gallons, according to size; that water runs out in perhaps 12 or 14 seconds, and it may take half a minute again to refill it; that is a contrivance which, as far as my experience goes, is a very good contrivance for the poorer localities.

2402. Mr. *Benyon.*] Would the water companies be inclined to do the same?—Yes, I think that with those other contrivances which we have put up in the City of London they would do so.

2403. *Chairman.*] Have you tried it?—Yes.

2404. Mr. *Clerk.*] In Captain Tyler's Report, at page 31, there is a description of the use of waste-water preventers in the East London district as well as a ferrule?—Yes.

2405. *Chairman.*] We had the engineer of the East London Company examined, and he told us that nothing of the sort was in use in his district?—It is in the East London district as well as the east of the City of London; I know several places in the East London district, outside the City, where those waste-water preventers exist.

Mr. *Clerk.*] Captain Tyler says in his Report, "There are now 40 of these waste preventers working in the East London Company's district, and giving satisfaction alike to the company and to those who resort to them."

Mr. *Cripps.*] We shall propose to give the Committee evidence directly upon that part of Captain Tyler's Report.

2406-7. Colonel *Hogg.*] In the richer districts round London you would prefer

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prefer the system to be a system of constant supply?—Yes; but in the poorer districts the cisterns are so liable to be fouled, and the people abuse every appliance that you can place to those cisterns, that I would abolish cisterns and adopt those waste-water preventers which only admit of a certain quantity being drawn at a time, for the richer the district the more the cistern is taken care of; and on consideration of all the circumstances of the case, a ferrule appears to me to be the proper thing to be used.

2408-9. Would not that contract the supply in case a man wants to fill a bath?—He must have a cistern which will hold what he considers to be necessary for his day's supply, and according to the size of the ferrule would be the proportion of water delivered in the 24 hours. There would be no difference between the present condition of things and that, except that in the one case you are receiving water only during the time of it being on, and in the other case you are receiving it over the 24 hours.

2410. Mr. *Clerk.*] With regard to the small class of cisterns which are now in use, with regard to the ferrule and to the diminished orifice, those 20 gallon cisterns, do you find that those are kept free from deposit as used in the east of London?—We have not any such cisterns in the City that I know of.

2411. But you have seen what Captain Taylor has called here a small cistern, supposing that a cistern were adopted holding not more than 20 gallons of water, with a ferrule that would cause water to be constantly running into that cistern, would it not?—Yes, certainly.

2412. What is your opinion with regard to such a cistern, as to whether it will keep the water free from deposit?—It is a closed cistern, I apprehend, and nothing will get into it.

2413. Lord *Frederick Cavendish.*] Have you ever known the water in a cistern become impure from too close contact with a water-closet?—Yes, the gases which are evolved from the closet are absorbed by the water in the butt, which is, generally speaking, in the poorer class of houses placed close to the closet, and this has been such a constant source of pollution in the City of London that I have for some years done away with the supply of water to closets because the pipe that delivers water from the butt to the closet is the means whereby the foul gases are carried from the closet to the butt.

2414. But you do not adopt, do you, any cisterns in the case of those poor houses?—No; by putting down into the closet, three or four times a day, a pail of water, we can keep it cleansed.

[The Witness withdrew.

Dr. *William Odling*, called in; and Examined by Mr. *Denison*.

Dr. *W. Odling.*

2415. You are Lecturer on Chemistry to St. Bartholomew's Hospital?—Yes.

2416. You have had a good deal of experience in examining water for the supply of towns?—Yes.

2417. You were for two years officer of health for Lambeth?—I was.

2418. Did you assist Dr. Letheby and Mr. Abel in analysing the various samples of water in December last, and in January and February of this year?—Yes.

2419. Water from the West Middlesex, the Grand Junction, the Southwark and Vauxhall, the Lambeth, the Chelsea, the New River, and the East London Waterworks?—Yes.

2420. In fact those tables which Dr. Letheby has put in, were the result of your joint labour?—Yes, they were.

2421. I suppose you have been in the room whilst Dr. Letheby was being examined?—I have.

2422. As I observe my learned friends on the other side do not raise any chemical questions, I do not think I ought to do more than ask you whether you agree with Dr. Letheby?—Substantially, I do. There are one or two small points of difference of opinion, but nothing that I think necessary to mention to the Committee.

[The Witness withdrew.

Frederick Augustus Abel, Esq., called in; and Examined by Mr. *Denison.*

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2423. You belong to the Royal Naval Arsenal, at Woolwich?—I do.

2424. Are you Vice President of the Chemical Society?—I am.

2425. You direct the Chemical Establishment of the War Department?—Yes.

2426. You are the third gentleman here who took part in these analyses?—Yes, I am.

2427. I will put the same question to you as I did to Dr. Odling; do you stand to your guns?—Yes.

2428. Do you agree with Dr. Letheby's evidence?—Yes, I do.

2429. You are ready to be cross-examined upon it?—Perfectly.

[The Witness withdrew.

Mr. *Denison.*] We will stop at that point, but if any new matter is started, probably the Committee will allow us to have something to say to it.

Chairman.] If any new affirmative case is set up, you will have an opportunity to answer it.

Mr. *Denison.*] Subject to that, we have finished our case.

[Adjourned to To-morrow, at Eleven o'clock.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Tuesday, 4th June 1867.

MEMBERS PRESENT:

Mr. Ayrton.	Lord John Hay.
Mr. Henry Baillie.	Colonel Hogg.
Mr. Benyon.	Mr. Kekewich.
Lord Frederick Cavendish.	Mr. Sclater-Booth.

ACTON SMEE AYRTON, Esq., in the Chair.

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Mr. *Cripps* was heard to address the Committee on behalf of the Metropolitan Board of Works.

John Frederick Bateman, Esq., called in; Examined by Mr. *Wilkinson*.

J. F. Bateman, Esq.

2430. I believe you have been engaged as a Water Engineer, and in constructing works for the supply of water to towns, for nearly 30 years?—I have.

2431. During that time have you constructed, either in whole or in part, the waterworks of 25 or 26 different towns and cities?—Yes; I have.

2432. And the gross population of those cities amounts to upwards of 2,000,000?—Yes; that is so.

2433. Besides that, you have been engaged in constructing other waterworks, and you have been consulted upon waterworks throughout the country, have you not?—Besides the actual construction, in whole or in part, as you put it correctly, in the places you have indicated, I have been connected with, in one way or another, and consulted upon, very many other waterworks in the kingdom.

2434. I believe your experience commenced with the manufacturing districts?—Principally in the North of England.

2435. At that time, as we know, the question of water supply was in a very crude state indeed?—It was; at least it was in so far a crude state that it was limited in quantity, and there were many towns which had not at that time any regular supply of water at all.

2436. But what system was commonly adopted at that time in that district?—The constant supply system. The intermittent system of supply was scarcely anywhere adopted; nowhere, I believe, except where the water had to be pumped; wherever water was supplied by gravitation 30 years ago in the north of England it was supplied upon the constant supply system.

Chairman.] Perhaps you will take care, in order to prevent our getting into confusion, that we should have it distinctly, whether it is a direct constant supply or a constant supply with intermediate cisterns, or any other apparatus, as you go into each case.

2437. Mr.

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2437. Mr. *Wilkinson* (to the *Witness*).] Is it the fact that out of the 20 towns which you have mentioned as having been supplied by you, there are but three which at the present time give an intermittent supply of water?—Three I think only that I am immediately connected with, and I think not more than 200,000 persons out of more than 2,000,000 persons, which the waterworks that I have been connected with supply, are supplied upon the intermittent system.

2438. And those I think were towns in which the waterworks existed upon the intermittent system before you were consulted upon the subject?—Yes. Those three towns are Chester, Birkenhead, and Belfast. In Belfast we are now constructing new gravitation works, and as soon as they are completed the intermittent system will be abandoned.

2439. With regard to the towns of Manchester and Glasgow, I think you have changed their mode of supply from the intermittent to the constant system?—Yes, I have; and the town of Wolverhampton and the town of Stockport also I have changed.

2440. My learned friend, Mr. Cripps, read a passage from a pamphlet which has been published under your name, giving your opinion as to the question of constant supply?—Yes. That pamphlet, I think, is a paper which I read at the request of the Society for the Promotion of Social Science, at one of their meetings. But will you allow me to correct an observation which, I believe, you yourself made, that I was the discoverer or originator of the constant supply system. I take no claim for such a distinction as that. I found the system existing in my earlier experience; I knew no other, and never attempted to carry out any other.

2441. Without reading to you again the pamphlet which my learned friend, Mr. Cripps read, does it contain the result of your experience and your deliberate judgment?—It does.

2442. In one paragraph of this pamphlet you state that you think it is a delusion to believe that the consumption under the constant supply system is so great that no company or waterworks can meet the demand. I will ask you to give the evidence of your experience in the particular cases where you did inquire, and give me the statistics of the water supply in some of the manufacturing towns of Lancashire and Yorkshire?—The general consumption of water in the manufacturing towns of those counties, which include a very large population, is from 16 to 21 or 22 gallons per head per day, including the supply of water for all purposes. In Manchester, where the supply has been constant and unlimited since about the year 1852, the supply is about 21 or 22 gallons per head per day, and of that one-third, or thereabouts, is supplied for trade purposes, leaving the actual supply for domestic purposes about 14 or 15 gallons per head per day.

2443. That is the actual experience of Manchester. Without fatiguing the Committee with the details of other towns, is it the fact that at Preston, Blackburn, Bolton, Stockport, Halifax, Warrington, and almost all the other manufacturing towns in the north of England, that is about the average consumption upon the constant supply system?—That is so; 15 gallons per head per day for domestic purposes, or for domestic purposes eliminating trade purposes, it would be about from 12 to 15 or 16 gallons per head per day.

2444. Mr. *Kekewich.*] You do not mean for domestic purposes only?—I mean for all purposes except those purposes which may be called directly trade purposes. The quantity of water which is supplied to Manchester in gross is about 13,000,000 gallons a day, the population supplied is from 600,000 to 650,000 persons, and out of the 13,000,000 gallons per day the present quantity supplied for trade purposes is about 4,200,000 gallons, and the difference is that which is supplied for all other purposes.

2445. Mr. *Baillie.*] Do you include in trade purposes watering the streets, and so forth?—Not in the Borough of Manchester, because the supply there is in the hands of the Corporation, and they would not charge themselves with the watering of the streets; but the water which is paid for, and returns a rent from the water consumers, amounts to 4,200*l.*; the quantity for which rent is paid amounts to that, and, of course, street watering would be additional to that.

2446. Do you include street watering in the 19 gallons a day, which you say is the total consumption?—Street watering would be included in the 14 or 15 gallons a day; indeed that is one of the common purposes of a town, and ought to be included amongst them.

2447. *Chairman.*] In fact, it is all purposes, except for manufacturing purposes, measured by meter?—Yes; except what is measured by meter.

2448. So that all stables and other purposes connected with town use are included in the residuum?—Yes.

2449. Mr. *Wilkinson.*] In Manchester you assume it to be one-third for domestic purposes?—It is not a matter of assumption; 4,160,000 gallons is the last estimation of the total quantity consumed.

2450. The amount of the estimate for the supply for manufacturing purposes is about one-third of the gross supply?—About that, as nearly as may be; 4,200,000 gallons, or nearly one-third of 13,000,000.

2451. Does your estimate of the rate in other manufacturing towns exemplify what you have stated?—No; I know it by actual measurement in many other towns; in Halifax I know the exact quantity of water which is used for trade purposes, and what is left for domestic purposes, and the same in many others.

2452. Does that establish pretty nearly the calculation of the average of one-third for manufacturing puposes?—No; the trade consumption varies with the character of the town.

2453. *Chairman.*] You might assume this report as put in, and go at once to the arrangements by which the supply is accomplished; you, perhaps, might take one town by way of example, and state exactly what has been done in Manchester?—In Manchester the town was formerly supplied upon the intermittent system, and about the year 1851, or 1852, or 1853, it was entirely changed from the intermittent to the constant system; Manchester was divided into districts, over which a very careful supervision was established, and every approved appliance for the supply of water was compulsorily introduced; and as the districts became accustomed to the new state of things, it was gradually put on till it became a permanent supply upon the constant system. The supply is simply a constant supply, and the owners or occupiers may introduce cisterns or not, as they choose.

2454. How is the water put on; with what head on the mains?—It is supplied under three different pressures. There are three zones of supply, according to the varying elevations of the districts; one from the higher source, a second from the intermediate level, and a third from the lower one.

2455. Can you give us the head of water in each?—The pressure will vary generally from per house 60 or 70 feet to 150 or 180 feet in each zone. I always endeavour in every waterworks to secure at least 70 or 80 feet of pressure, and never to exceed, if I can help it, 180 or 200 feet.

2456. Do you mean in each zone?—In each zone the pressure will vary from 70 or 80 feet to about 150 or 180 feet in Manchester; the larger houses are supplied in the ordinary way in which large houses are supplied, either by cisterns or not, because a cistern is not a necessary piece of the apparatus, except to the waterclosets; the smaller houses are universally supplied without cisterns, and in the very poorer parts of Manchester, where the houses are clustered together without conveniences for taking the water into the house, stand pipes, or wall plates, as they are called in some places, are introduced which are the property of the Corporation, and to which everybody has access.

2457. That is the Corporation standing in the place of the Water Company?—Yes; the Corporation there does stand in the place of the Water Company, and everybody is entitled to have water, and everybody is compelled to pay for water whether they take it or not.

2458. Are the communication pipes laid on by the Corporation?—With regard to the communication pipes in Manchester, I am not sure, but I believe they are; I may say that it is the custom with most companies, and, indeed, it is the habit of the country generally, that the communication pipes up to the wall of the house, are laid by the company or by the Corporation, and from the wall of the house into the interior, and all the appliances in the interior, are at the expense of the occupier or owner.

2459. Mr. *Henry Baillie.*] Where the water is supplied without cisterns, have they a very small pipe?—The ordinary cistern pipe is half an inch in diameter, or

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or from 3-8ths to half an inch; a large house under the constant supply system, requires no more than half an inch communication pipe; I was about to say that the custom which I endeavour to introduce into Manchester, and which was for some time carried out was, that the Corporation should itself be its own plumber; almost all companies and Corporations are their own plumbers, for the purpose of securing the best workmanship and the best description of tap or valve; but that was slightly relaxed in Manchester until they came to authorising a certain number of plumbers, who were bound to adopt certain rules and to introduce pipes at such a strength, and taps and other appliances of such approved construction as the Corporation determined.

2460. *Chairman.*] Now will you give us a description of the apparatus within the house?—If you take the lower orders, it costs nothing more than the expense of one tap in a cottage house.

2461. You mean that there is a half-an-inch pipe leading into the house with a tap on it?—Half or three-eighths of an inch pipe leading into the house with a tap upon it.

2462. Where is it led into, is it into a yard or into a room?—In many houses in Manchester the pipe is taken down the passage which commonly exists between a lot of cottage houses, and so introduced from the back with a stand-cock; and the water-closets of the houses, in a certain number of the houses, are commanded by this stop-cock, where it is taken from the district main, and those houses are dependent upon their water coming through that particular pipe, in case of alteration or addition the water has to be shut off, so that a number of houses would for the time of the alteration have their water supply suspended.

2463. Each house has a tap in it I suppose?—Yes; each house has a tap in it, or two, according to the size and character of the house.

2464. Is that tap over a sink or in a room, so as to punish them if they neglect it?—Over the sink in all cases, where it is in the house.

2465. Is it of a common pattern, so that it may run into the sink?—No; they are all screwed down taps of the best possible construction; one of the stipulations to the licensed plumbers is, that nothing but screw-down taps of the best construction shall be employed.

2466. What is a screw-down tap?—A common ground tap which is used in many towns, and I believe is in common use in London, is a mere ground brass tap with a hole through it, so that when it is closed the hole is against the upper and lower side, and when opened, the hole being longitudinal with the opening of the pipe, allows the water to escape; by use it is constantly getting loose, and that wastes the water occasionally enormously; a screw-down tap is a tap that requires screwing down (there are various kinds), but in such a way that it requires to be unscrewed with some little labour; they cannot be suddenly opened, and when screwed down it fits upon a leather seat, which effectually prevents the escape of water, and, if the tap is in tolerable order, there can hardly be any appreciable waste.

2467. Is there any precaution to prevent them leaving the tap open, and the water running through to waste down the sink?—Nothing but supervision; but we do not find, either in Manchester or any of the towns where the constant supply has become the custom, any material amount of waste where they can always get the water; under the intermittent system it is very different.

2468. Then does it run out from this tap that is half an inch in diameter?—About three-eighths of an inch tap would be a cottage house tap, or, at the most, half an inch.

2469. Running with the head of water you mentioned?—Yes; running with the head of water I mentioned in Manchester; but I should hardly say with that full amount of head, of course, because the pressure is, to a certain extent, taken away during the day by the draught in the pipe, but it is always with a considerable head of water.

2470. Mr. *Wilkinson.*] I am in a position to lay before the Committee the taps in use in Edinburgh. Will you take these into your hands, and explain them to the Committee (*handing some taps to the Witness*)?—This is a common ground tap, which is simply a plug with a hole, and that by use backwards and forwards gets very loose, and when loose it leaks very much indeed, and there is a sudden shock upon the pipe by closing and opening it suddenly, which is injurious occasionally. The other is a screw tap, in which there is a loose valve, and the water coming through there is screwed down by a little bit of leather, and that takes off the shock; and if it is in tolerable order, it is hardly capable of leaking; and all that is required, instead of having to grind them, is to put a fresh washer in when that gets out of order (*describing the same*).

2471. *Chairman.*] You said that there was no protection against its being left unscrewed, but supervision?—Nothing but supervision.

2472. What supervision is there at Manchester?—Scarcely any at all, so accustomed are the people to the use of water; and so unnecessary do they find it to let their taps run, that they merely draw the water when they require it.

2473. We have had it in evidence that there is a great disposition in people to run away with the taps altogether in London, what is your view of that with regard to Manchester?—I do not find it to be the case in Manchester more than in any other town. There may be taps stolen to a slight extent, but certainly not to any material extent.

2474. Is the tap for the most part within a room, or is it in an open place where anybody can cut it off?—Generally in a room; but it might be cut off in a room by a tenant leaving. But to have a tap constantly running would not only splash over, but it would be a very noisy, disagreeable thing, and therefore a respectable and decent tenant, for his own sake, would not keep his tap running. Very likely he is living in the same room in which the tap is.

2475. However, as a rule the tap is within a closed room, so that it is not open to be stolen by anybody loitering about the premises?—No, nothing but the wall plates are exposed; it is almost always in a room, I think, with very few exceptions, because taps exposed in the outer courts would be liable to freeze and burst, and therefore that is always avoided. The wall taps are either very thick masses of iron, which would not freeze, or they are put into wood which prevents them from freezing, and they could not be got at to be taken off except they took the whole thing. They are made of brass embedded in iron or in wood, to prevent their being affected by the frost, which also prevents their being stolen by men.

2476. In the case of a house which is let out to separate occupiers, how do you find the occupiers get the water?—That is not a common custom in Manchester; they are nearly all self-contained houses; there are generally small houses, almost all of them self-contained, that is to say, with one family in each house. There are houses let out in apartments, but they are exceptional; the general custom is, that each family occupies a house.

2477. In the large houses which are let out in apartments, is there one tap or separate taps for each floor?—I do not think there are are any large houses let out in apartments; but it is so little the custom in Manchester to let out in apartments that I cannot tell you.

2478. Will you explain to us what efforts you made with regard to the water-closets?—Each water-closet has a cistern. I have not had anything to do of late years with the mere internal fittings, and never had anything to do with them except in prescribing general rules, and therefore I cannot tell you now what plan is adopted specially with regard to water-closets, but I know that the rule is that every water-closet shall be provided with a cistern, and a great exertion has been made to introduce the best kind of cistern, not so much for the prevention of waste, because we have not experienced much waste in Manchester, as for the purpose of introducing generally the best appliances.

2479. Are there water-closets in all those small houses in Manchester?—No; not in the very small houses; the arrangement is, that each house containing one family has a back-yard to itself, and they have a privy and a dust-bin or ash-pit immediately behind, into which the ashes of the house are thrown, and the whole of the night-soil from the privy with the ashes is taken away, the Corporation acting as scavengers; so that the water-closet is not a common appendage to a poor man's house. Amongst the upper classes of course it is universal; but in the small houses, of which there are a great number in Manchester, there are no water closets.

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2480. In the upper class of houses, I presume, there is a complete apparatus of a trap and everything necessary for flushing the water-closet?—Yes; everything in the usual way, either with or without a cistern, at the option of the owner of the house.

2481. Colonel *Hogg.*] Have the cisterns waste pipes in the larger houses?—Yes; a cistern without a waste pipe would be an intolerable thing; unless it were put outside the building it would be utterly unbearable, because the ball cock may get out of order by accident, and the water would overflow the cistern and inundate the house; of course it requires that the ball cock should be specially attended to, and that the best description of ball cock, as far as possible, be introduced.

2482. Mr. *Wilkinson.*] Before leaving the subject of waste pipes at Manchester, is it the custom there to take precautions that the waste pipe should be in such an exposed situation that any waste would be readily detected?—I do not think it is, but there has been no difficulty in Manchester that I am aware of; nothing that could be called a difficulty; they would take, perhaps, eighteen months or a couple of years in the gradual introduction over the whole city before it was a universal constant supply; but I have never heard of any opposition nor any complaint on the part of the owner of a house of the expense to which he was put, nor any complaint of misuse or mismanagement.

2483. Has it been necessary, in order to change the system, to introduce any specific plan of inspection?—An inspection was introduced at the time of the change, and the inspection has continued, but it is not a very stringent or a very expensive inspection.

2484. Can you describe the system of inspection?—I cannot; they have a large number of men.

2485. Can you tell me by whom they are employed?—By the Corporation; the Corporation being the suppliers of the water.

2486. So that in that case there is no collision of interest between the consumers represented through the Corporation and the suppliers, the Corporation being the suppliers of the water?—No; their interests are all in common, and the Corporation are desirous on all grounds of giving a full supply of water; and very many difficulties are got rid of from the fact of everybody having to pay for the water, and, everybody being entitled to the water, there is no stealing.

2487. Everybody being compelled to pay for the water whether they use the water or not?—Yes.

2488. About the cost of the apparatus at Manchester, can you give any information to the Committee?—Yes; the cost of supplying a cottage house with water all through that part of the kingdom, as I know from having had a great deal to do with it, will vary perhaps from 12 *s.* to 15 *s.* a house for the whole apparatus, including the communication pipe, the tap, the labour, and everything.

2489. *Chairman.*] Do you mean the communication pipe from the wall?—Yes; the communication from the wall, the tap, and the labour beginning at the wall.

2490. When the change took place did it become necessary to make any change in the part of the communication pipe which was laid down by the Corporation?—No; I do not think it did; it might have been that here and there a few pipes would burst, but there was no systematic change whatever, and yet the pressure was immediately increased about 100 feet over the whole district.

2491. Do you mean on the communication pipes running up through the houses to the cisterns?—No; not quite 100 feet; it was about 70 or 80 feet pressure over the whole city; and it was increased about 70 or 80 feet.

2492. Was it necessary to make any alteration in the communication pipes continued into the houses up to the cisterns?—No; no alteration was made in that respect.

2493. Can you give us any information as to the exact quality of those communication pipes as compared with the pipes used in London?—No; I cannot, because I do not know the quality of the pipes used in London; but I am told that the lead pipes which are used in London are as strong, that is to say, are as heavy per lineal foot or yard as the pipes which are made in Manchester, and in

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in general in the towns of the north of England; half-inch pipes are in use in general in the north of England, about 6 lbs per yard.

2494. Was the old pipe that was used in London a cast pipe?—I do not know.

2495. The new pipe, I presume, is a drawn pipe?—The new pipe would certainly be a drawn pipe.

2496. Do you know the relative expense of a cast pipe and a drawn pipe?—No, I do not; a cast pipe has never been used since I have had anything to do with the waterworks.

2497. Mr. *Wilkinson.*] Assuming the weight of the pipes to be equal in London to those in use in the north, do you suppose that the change from the intermittent to the constant supply would render necessary the construction of new pipes connecting the communication pipes with the main, either the district or the principal main, as the case may be, in the majority of cases?—Certainly not. When the water was introduced into Glasgow, which was partially an intermittent supply, and partially a constant supply, the pressure was increased at least 100 feet over the whole of the city; and although here and there a few pipes might have burst, there was nothing like a general alteration whatever. Here and there defective pipes told their own defects, and had to be supplied; but there was there nothing like a complaint of the alteration, or of the cost, nor was it necessary to make any extensive alteration.

2498. Mr. *Henry Baillie.*] Do you know anything of the water supply of Glasgow?—Yes; I supplied Glasgow with water.

2499. Is it true that the consumption of Glasgow is so enormous as has been stated?—Yes; the consumption is very great indeed; extravagantly great.

2500. We have been told that it amounted to 60 gallons per head?—About 50 gallons per head per diem. I may mention, perhaps, that amongst the places that I have been supplying with water are, St. Helens, Macclesfield, Blackburn, Ashton, Darwen, Kendall, Stockport, Manchester, Glasgow, Gloucester, Sterling, Belfast, Birkenhead, Wolverhampton, Newcastle-upon-Tyne, Chester, Warrington, Halifax, and many other places besides.

2501. Mr. *Wilkinson.*] I was going to ask you one question; you mentioned from 12*s.* to 15*s.* per house as the cost of the new supply, did you not?—Yes; for the whole thing put in force; an entirely new supply.

2502. But what would be the cost of the alteration from the former system?—I do not think that the alteration would be anything in 19 cases out of 20, except for a new tap; that must be introduced in all cases before the constant supply could be given.

2503. What would be the cost of a new tap?—From 1*s.* 9*d.* to 2*s.* 6*d.*

2504. And supposing the existing pipes to be heavier in weight than the pipes required for the constant supply, which would be of less diameter, there would be something to be taken to credit for the sale of old material, would there not?—If new pipes had to be introduced, and if it only cost 15*s.* to introduce them, if it is to cost 8*l.* or 10*l.*, as I have heard it here given in evidence, to take out the old pipes and put in the new, they had better leave the old ones where they are; but if the old pipes could be conveniently removed, those pipes being larger now, and therefore heavier per yard than those which would be needed under the constant supply system, most likely the money obtained for the old pipe would pay the whole cost of the new, and in some cases more than that.

2505. *Chairman.*] You mean the produce of the old pipe?—Yes; lead is worth just its weight; and, therefore, when the lead is taken out, the old heavy pipe, would very likely pay the cost of the new smaller pipe.

2506. Mr. *Wilkinson.*] I gather from your last reply, that you consider the evidence which you have heard given here, as to the cost averaging 8*l.* or 10*l.*, or even 12*l.* a house, is a very exaggerated estimate?—I do not understand it. I cannot comprehend it. In my own house, in Great George-street, it would not cost me a penny. I should make no alteration, except so far as the taps might be concerned. If I have bad taps, or a bad ball-cock, I should only have to change them.

2507. You do not think that a change of pipe would be necessary?—I do not

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not believe that a change of pipe would be necessary; if it were, I should have to put in a new pipe, but nothing else.

2508. I think one material ingredient in the cost of the communication pipe up to the main is the opening of the street, if I remember rightly; have you taken that into account, or do you think that in the majority of cases, assuming the present pipes to be in an average state of repair, that would be necessary?—I do not think it would be necessary, and I gathered that it would not be necessary from the evidence that I heard yesterday; Mr. Morris gave two instances, one of a six weeks' experiment, and another of a 12 months' experiment; and he spoke, certainly, of the bursting of pipes, but I am quite sure that if the bursting of pipes had been general, it would have been utterly impossible to have continued either the six weeks' experiment or the 12 months' experiment; there would have been such an outcry on the part of those who were supplied with water. The fact that he stated proves to me that the bursting of the pipes must have been very small in proportion; again, the whole thing was left, as he said yesterday, to the plumbers; and it is not the interest of the plumbers, looking at it as a merely trading question, to put in lighter pipes, the stronger the pipes are the better for them, and the heavier they are; and therefore, if it had all been left to them, without any regulation on the part of the company, the probability is that the pipes were strong enough in most houses.

2509. I see that it was considered by some of the witnesses who gave evidence as to the cost, that it would be necessary to entirely refit a house with new pipes, caps, and everything else, and that they would cost some 8 *l.*; you do not concur in that opinion?—No; I do not concur in that opinion, nor do I think it would cost 8 *l.* in the majority of cases; certainly 8 *l.* would not be the average over the whole of London; in the case of a very good house, it might cost that, or more, but upon the average of houses in London, it certainly would not cost that; the mere introduction of a pipe without a water-closet, in the poorer houses, would not be more than 15 *s.*; call it 1 *l.*, and the water-closet additional, need not be more than another 1 *l.*; 2 *l.* would be sufficient for a vast number of houses in London, with a new supply entirely and a water-closet.

2510. *Chairman.*] When you say a water-closet, what do you mean?—I do not mean the water-closet itself, but I mean the means of supplying the water-closest with water, the cistern, and the necessary communication for it.

2511. Do you mean the apparatus of the water-closet?—No; not the apparatus of the water-closet, because that is a thing of itself, that is there in any case, whether the supply is intermittent or constant.

2512. Mr. *Wilkinson.*] In giving those answers as to the cost, do you imply that some proper precaution should be taken to prevent the consumer or the plumber supplying the consumer, from putting down improper pipes and unworthy pipes?—Very considerable power ought to be vested in somebody in the passing of a Bill, for the purpose of seeing that everything is of the best construction, that the work is properly done, and also for preventing waste.

2513. That is quite contrary, is it not, to what is the rule in London at this moment?—Yes; I never laid out the whole details of a waterworks without prescribing most strictly the weight of pipe to be used in the leaden services, and the character of the tap to be used, and without requiring in the best way I could, the fulfilment of those rules; I do not wonder at the waste of water, if nothing is done in the way of regulating the character of the tap, and the kind of pipe to be used.

2514. Did you hear Mr. Morris's evidence as to the requirements in London of the company which he represented at the present moment?—I did.

2515. That they never interfere with the internal fittings of the houses at all; that they have no rule whatever, and that persons are allowed to put down whatever they please in their own houses?—I heard him say so.

2516. That is a system which you think requires correction?—It is a system which has been utterly exploded for the last 30 years in the north of England; it is no system at all.

2517. Probably you were somewhat surprised to find it in existence in such a town as London?—I was hardly surprised; I knew that the plumbing was so bad in London, that I was hardly surprised in finding that to be the condition of things, but still it is a most negligent way of supplying water; the taps,

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which are the great wasters of the water, are certainly very bad in London, generally.

2518. In this case it seems to have been the neglect on the part of the companies themselves in not taking care to see that proper provisions were made with regard to the internal fittings?—It is so; I presume that this paper which I read before the Society for the Promotion of Social Science will now form part of my evidence. I mention the great changes which have recently taken place.—(*The Witness delivered in a Paper to the Committee.*)

2519. You have stated in that paper that there is nothing in the system of constant supply which would necessarily create a larger consumption of water than would be caused by an intermittent supply?—Certainly not; if your fittings were in proper order.

2520. One instance that you give is Cambridge; I will not ask you upon that, because we have the Engineer of the Cambridge Waterworks here, and will pass on to Newcastle-upon-Tyne. You are the principal engineer there, I think?—I am.

2521. Have you received a report from Mr. Main, the manager of your company, upon that head?—Yes; I have.

2522. You say, "at Newcastle-on-Tyne, the water has always been delivered on the constant supply system, but the consumption gradually increasing to an extravagant point, a vigilant inspection was introduced, and means taken for checking the wasteful expenditure of water, sufficient powers having been granted to the company by a recent Act of Parliament." I will ask you presently, when the opportunity serves, if you can point out to the Committee the clauses in that Act of Parliament, which in your opinion are valuable with regard to that point, but Mr. Main reports to you as follows: "Our gross daily consumption is 30 gallons per head, of which seven gallons go to manufacturers and trades; considering 23 gallons per head to be excessive for domestic consumption, I was anxious to ascertain precisely where the water went to; for this purpose, I had the town divided into small districts of three or four streets completely isolated, and put on a street meter to register the daily consumption. On comparing the results in districts where water-closets prevailed with those in which there were none or comparatively few, it was soon apparent that the water-closet generally from being out of order, but in several cases from the crank handle being purposely propped up, was the great consumer. The following are a few of the results." Then you give a detail of the results, showing a very consumption, the largest being 80 gallons?—In that table, the upper portion numbered from one to seven inclusive, attached to a district supplied with water-closets varying from one to four persons to one to 12 persons, the average probably being about one water-closet to every six persons.

2523. *Chairman.*] What class of houses were those?—Those were the better class of house in Eldon-square, Leazes-terrace, and so on, and the consumption in those houses varied from 55 to 80 gallons per head per day; the other houses were smaller houses where there were few water-closets, one to 35 inhabitants in one case, one to 48 in two other cases, and one to 157 in the third case, and there the consumption varied from 11 gallons per head per day, where the water-closets were the fewest, to 30 gallons per head per day where they were the most numerous.

2524. Then Mr. Main's report goes on to say, "In order to stop so flagrant a waste we set on a staff of men to examine every water-closet and tap, and report them, leaving a notice that, if not put in order within three days, the supply would be stopped; after the lapse of three days another set of men followed, inspecting only those places reported as leaking, and shutting off the water where the notice had been disregarded; in this way we stopped an immense waste, the effect being immediately apparent in increased pressure throughout the town; but that measure was only for a temporary purpose, and could not be relied upon to effect any permanent saving, and for upwards of 12 months we have been going on systematically, replacing the present water-closets with Guest and Chrinie's double valve cistern, and Thomson and Murray's valve cistern, neither of which can be propped to cause a continuous run; in this way we have reduced No. 3 District from 55 to 34 gallons per head, No. 5 District from 60 to 39 gallons per head, No. 6 District from 61 to 25 gallons per head, and No. 7 District from

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from 62 to 26 gallons per head," and so it goes on?—Yes; and there is an important observation there, "In carrying out the change, we occasionally meet with opposition, but not as yet to any extent; in one district we put new double valve cisterns into every house by arrangement with the landlords; the result was as follows;" that from 32½ gallons per head per day the consumption was reduced to 16½ gallons per head per day; in another case the consumption per day, before the improvement in the water-closets and taps, was 31 gallons per head, and after the improvement it was 12 gallons per head.

2525. *Chairman.*] Do you know the expense of those cisterns?—No; that I do not know.

2526. Mr. *Wilkinson.*] Then you go on to specify that which you have already stated to me, that you think that really the great waste is occasioned very much by the defective state of the fittings?—Yes; that is so.

2527. Manchester you have already given us. At page 9 you make this statement as the general result of your investigation upon the question of waste. "It will be thus seen that where everything is in good order, and both the water provider and the water consumer do their respective duties properly, there is no disadvantage to either party by the supply of water on the constant supply system, while the advantage to the consumer in the facility with which he obtains water, and the trifling cost at which it can be introduced into his premises, are incomparably greater than can be enjoyed under the other system. Where, however, the intermittent system has hitherto prevailed, the desirableness, and, indeed the practicability of abandoning it, and adopting the constant supply, depends very much upon the consumers. If they will submit to such regulations as are necessary for preventing waste, there can be no difficulty in introducing constant supply; it will consume no more water than the intermittent system; the only changes which are required are the abandonment of all bad fittings, such as common ground taps, leaky cocks, and wasteful water-closets; the cisterns already existing in houses which have been adapted to the system hitherto employed may remain if it be the will of the owner or occupier that they should. If they are large enough they do now practically give a constant supply, and it is only just to the provider of water that care should be taken to prevent improper use. Those who prefer to abandon their cisterns, and to take their water direct from the pipes, can do so at very little expense; in all new buildings there would be no necessity for the expensive paraphernalia of cisterns; a stop-cock on the service-pipe of the house would enable the water to be turned off whenever repairs or alterations were required to be made within the house. Little inconvenience is felt by grouping a number of houses together commanded by one stop-cock; and indeed it may be said that complaints of inconvenience arising from interruption to the supply of water are scarcely ever heard in towns where the constant supply is at work. If the public will not submit to introduce the best description of fittings, and to prevent waste, and will not subject themselves to the vigilant inspection which ought to be exercised by the provider of the water, and be willing to correct everything which requires correction, it will be difficult, and in some cases impossible to introduce the constant supply." That represents correctly your views upon this point?—It does.

2528. *Chairman.*] At Newcastle there would seem to be necessaries or privies that are common to large rows of houses?—I had occasion to inspect Newcastle-upon-Tyne under the Royal Commission to inquire into the outbreak of cholera there, and I am sorry to say that at that time Newcastle-upon-Tyne consisted of 90,000 people, and 60,000 of them were without any provision whatever of that kind; they had no private privy of any kind whatever.

2529. Was there no privy in the courts in which the people lived?—No privy whatever; certainly there were not a half a dozen public privies in the town, and 60,000 persons out of the 90,000 had no privy or water-closet accommodation of any kind.

2530. Apart from that, are there a number of small houses or rows of houses which have privies in common?—Yes; that has been a good deal altered since then; that was in 1854; but still there is a very great want of that kind of accommodation in Newcastle.

2531. What arrangement is there where there is a privy for several houses; is there a cistern immediately to flush it?—No; ashes are put into it, and the soil is removed; there is no water-closet cistern amongst the lower classes; the best houses in Newcastle-upon-Tyne, which are very good, have water-closets almost universally, but amongst the lower classes there is no water-closet accommodation.

2532. Mr. *Wilkinson.*] Before I call your attention to other towns which have been cited in evidence here, you have, have you not, the Newcastle Act before you, and it may be convenient to call the attention of the Committee to the clauses which have been found valuable in Newcastle?—Under the ordinary provisions of the Waterworks Act, which is incorporated in almost all Waterworks Acts of the present day——

2533. *Chairman.*] The case of Newcastle is not of much use as an example, because it does not deal with the great difficulty which we have got before us, that every house, in London at all events, has or will have a separate privy, and the question is, how are we to deal with those in London?—I think you will find some valuable clauses here; it is only under the powers which this Act of 1863 gives them that they could have carried out the alterations by which they have been able so far to economise the water. In the Newcastle and Gateshead Waterworks Act of 1863, sections 93, 94, 95, 98, 99, and 100, are the important clauses having reference to the considerable powers which are vested in the company for the purpose of introducing the best kind of water, and giving them the power to cut off the water in case their regulations are not complied with. Section 93 provides that "The provision of 'The Waterworks Clauses Act, 1847,' (section 74) with respect to the recovery of water rates, shall extend to enable any inspector or any other person acting under the authority of the company to enter into any house or premises for the purpose of cutting off the supply of water to the same, when the water-rate due in respect of such house or premises has not been paid, and to cut off the same accordingly." The section 94, and this is a very important clause is, "The company may, from time to time, for the purpose of preventing the waste, misuse, or undue consumption of water, prescribe the size, nature, and strength of the pipes, cocks, cisterns, and other apparatus to be hereafter fixed for the supply of water." Then the next clause is, "Every person supplied with water by the company shall provide ball-cocks or stop-cocks, or other necessary apparatus of approved construction for regulating such supply, and shall keep the same in good repair, so that the water may be properly drawn off and effectually prevented from running to waste; and in case any such person shall, after being required by the company, neglect to provide such ball-cocks or stop-cocks, or other necessary apparatus, or to keep the same in good repair, any inspector or any other person acting under the authority of the company, may cut off the pipes or turn off the water from the premises of such person until such ball-cocks or stop-cocks, or other necessary apparatus be provided, or repaired, as the case may require." Then section 96 is, "The company shall not be bound to supply, or continue to supply, any water unless the pipes, cocks, water-closets, and other apparatus necessary for the supply, are constructed of such reasonable strength, materials, and size, and on such reasonable principle as are required or approved by the company, and are used so as to prevent the waste, misuse, or undue consumption of the water of the company and the admission of foul air, or other noisome or impure matter, into the pipes belonging to or connected with the mains or pipes of the company." Then the 98th section is, "Where any person supplied with water by the company willfully does, or causes to be done, anything in contravention of any of the provisions of this Act, or wilfully omits to do anything which under those provisions ought to be done for the prevention of the waste, misuse, or undue consumption, or the contamination of the water of the company, they may turn off the water supplied to him, and cease to supply him with water until the cause of injury is remedied, and also may recover from him in any court of competent jurisdiction the amount of any loss or injury which the company may sustain by reason of such Act or wilful omission; and the remedies of the company under this enactment shall be in addition to their other remedies in this behalf." The next section is, "Every person supplied with water by the company who shall wilfully or negligently suffer any pipe, cock, cistern, or other apparatus belonging to him to be out of repair, or shall wilfully or negligently do or suffer any act whereby the water supplied

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supplied to him by the company shall be wasted, or the supply thereof improperly increased, shall forfeit to the company for every such offence a sum not exceeding 5 *l.*" And the 100th section is, "The company may repair any such pipe, cock, cistern, or other apparatus, so that the water therefrom may be properly drawn off and any waste of water prevented, and the expenses of such repair shall be repaid to them by the person so allowing the same to be out of repair, and may be recovered as damages." That is followed up very much by enactment, the custom which had grown up in the northern towns of prescribing the kind of tap to be used, the strength of the pipes, and the other regulations to be observed.

2534. Mr. *Wilkinson.*] Those clauses you have found very valuable in Newcastle ?—They have been found very valuable there.

2535. Are you acquainted at all with the supply of the city of Chester ?—I am engineer to the Chester Waterworks.

2536. It has been brought before the notice of the Committee that the constant supply having been adopted there, they were induced to change it to the intermittent supply ?—That is so. In Chester the water is pumped from the river Dee. It is a very old fashioned directory. It might have been in London. They wished to introduce the constant supply, and they gave notice of their intention, and asked the co-operation of the inhabitants, and then they commenced it; but having taken no very special provisions to provide for it, the waste was very considerable, as it was in Mr. Morris's case, and after some time they abandoned it, and they give now a very continuous supply through the Dee, but they do not deliver during the night.

2537. Do you think that that is a fair instance to cite ?—No; I have no doubt that if they had been resolute enough, they might, as it has been done in other towns, have reduced the supply or kept it within proper bounds by proper vigilance and determination.

2538. Glasgow is another instance which has been cited ?—Yes; in Glasgow the waste has been always very great indeed. Glasgow is a city where water-closets have been almost universally introduced, and where the plumbing is as bad as plumbing can possibly be, and where it is the universal practice of the plumbers, in order to let the water run to waste in the cisterns, to introduce what are called deafeners, which are rags attached to the waste pipe to prevent people hearing that the water is running to waste; and the waste resulting from that and from other bad plumbing has always been excessive. I have done my best to arrest the waste there, but they have, as they suppose, an inexhaustible supply from Loch Katrine by gravitation. It costs them nothing; it washes their sewers, and it sweetens the Clyde, and therefore they allow it to exist.

2539. Mr. *Henry Baillie.*] But they say that you are draining Loch Katrine entirely ?—No; we are not doing that; we are only bringing now about 22,000,000 gallons a day from Loch Katrine, and Loch Katrine is fuller than ever it was. We have power to draw 50,000,000 gallons a day, which will still leave Loch Katrine fuller than it has been accustomed to be.

2540. Mr. *Wilkinson.*] Have you, in this pamphlet, gone fully into the circumstances of the case of the City of Glasgow ?—I have.

2541. I see that you mention as one of the great causes of waste the wretched character and condition of the kitchen taps and the water fittings generally ?—That is so; there have been periodical inspections. When I had occasion to draw attention especially to the subject of the waste, shortly after the introduction of the water from Loch Katrine, I found that the supply having been constant for many months, and every cistern therefore supposed to be full, in the dead of the night, between one and two o'clock in the morning, 14,000,000 gallons of water were going into Glasgow, all of which was wasted; and an inspection was then instituted, and from bad fittings over the cisterns, from bad kitchen taps, to say nothing of the water-closets, which could not be ascertained, the waste was 7,200,000 gallons a day; many cases were found of single taps running 800 gallons a day to waste, and which had been doing that for years, perhaps, for want of inspection.

2542. Then, leaving it to my learned friend to examine you in detail upon any points contained in this report of yours, does this represent the conclusion to which you have arrived: "The case of Glasgow will, no doubt, be much relied upon by the opponents of the constant supply system; but the extravagant consumption is clearly due to causes which may be remedied, and to the fact that the Corporation have never resolutely and perseveringly set to work to apply the requisite remedies. The people of Glasgow look upon Loch Katrine as practically inexhaustible. The works are constructed on a scale for bringing more than twice the quantity now used; they are their own property, and as the water is supplied by gravitation, the excessive waste which takes place costs them nothing at present." Is that the explanation which you give upon that subject?—That is so.

2543. Then with regard to the general question, I see that your report winds up with this statement: " I see no reason to doubt that if in this great metropolis the providers of water, and the consumers of water will each do their duty and work harmoniously together, the citizens may enjoy the inestimable benefit of an unlimited supply of water constantly laid on, without consuming a gallon more water, if, indeed, as much as is now supplied by the Water Companies"? —That is my deliberate opinion.

2544. But I gather from the answers you have given already, that in your judgment the constant supply should first be made imperative, independently of any requisition on the part of the consumers; is that so?—Yes, I do; and that certainly has not been carried out under the Act of 1852; in studying the clauses under which the constant supply is provided by that Act, I do not think that it is at all likely to be carried out unless it is made incumbent upon the Water Companies, quite independently of the inhabitants using the water; so far as the requirements or the constant supply goes, the companies of course would have to be specially consulted in the case of the constant supply in London.

2545. Therefore, I presume, as one of the points in which the company should be consulted, you would require that sufficient time should be allowed them in all cases to prepare for the constant supply?—Yes; the company should be allowed sufficient time, and they should be armed with very peremptory powers, and very summary means of having those powers carried into execution.

2546. But those powers you would hardly leave to the companies; should they not be under the regulation of some competent authority?—It is a difficult thing to answer that question quite without reservation; the companies certainly ought to have very large powers; but I think there ought to be a court of appeal in some form, either in the form of an independent inspector, in case of difference of opinion between the provider and the consumer, or in some other form; but the mode of proceedings should be very summary. The companies ought to prescribe what they consider necessary for their own protection, but they might prescribe that which would be unnecessary in my opinion, and perhaps in the opinion of others, and which would make the burden intolerable; and I think there ought to be an appeal against such an infliction as that.

2547. Is it, in your judgment, necessary that every house should be provided with a proper cistern and approved ball-cock with means of access, and that no overflow or waste pipes should be allowed in any case whatever?—It is not necessary to provide a cistern under the constant supply system to any house whatever, except for water-closets; but it is desirable and convenient in large houses, in the case of those who can afford to pay the cost of it, that cisterns should be introduced. In all cases where there are cisterns, waste pipes ought to be allowed, or else the occasional overflowing of the cistern in good houses, or in any house, would be a perfectly intolerable hardship.

2548. Is it necessary, in your judgment, that every house should be connected with the company's main by a separate service pipe laid on direct to the cistern? —A cistern not being a necessary part of the system, that falls to the ground. But it is not necessary that every house should be separately connected; groups of houses belonging to the same owner may have one connection, and the pipe may go from house to house.

2549. Do you think that it is right that no draw-off taps or branches from the service pipe should be allowed in any case?—That is not necessary.

2550. Do you think it necessary that the supply to every water-closet should be regulated by means of a water waste-preventer of approved construction?—Yes; I think it is.

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2551. And that all service pipes should be of sufficient strength to bear the increased pressure consequent upon the alteration in the mode of supply, the weight not being less than 2 lbs. per foot, and be provided with a stop-cock with means of access as near to the company's main as practicable ?—Yes ; those are generally necessary ; the weight of 2 lbs. per foot does not say to what diameter of pipe that applies ; therefore it is meaningless. If it is half an inch pipe, that is almost the right strength.

2552. Would it, in your judgment, be desirable to give the company's inspectors, or the water police power under the provisions of the Metropolis Water Act, to see that the fittings, &c., are in proper order, and to ascertain if there be any waste or misuse of the supply, and that in such case the parties should be summoned before a magistrate, and the fine provided by the Act imposed ?—Yes ; that is quite necessary.

2553. Are you of opinion that the alterations which I have mentioned would necessarily involve an outlay of from 5*l.* to 10 *l.* in each house ?—No ; I certainly am not.

2554. One question upon the subject of provision for fire ; have you considered that subject at all ?—Yes ; very largely.

2555. *Chairman.*] Do you know of any town where there is the system of water-closets throughout the small houses ?—In Glasgow that is so, and in Edinburgh also, I believe ; but you will have some evidence about Edinburgh.

2556. Glasgow does not appear to have produced any satisfactory results in that respect ?—No ; but that is accounted for in the way I have mentioned.

2557. Do you know of any other towns ?—I hardly do, where the system of water-closets is universal.

2558. Or nearly so ?—I do not know any, of my own experience, where water-closets can be considered to be nearly universal. They are very general, but not nearly universal. There are many houses in all towns, that I am intimately acquainted with, which have not water-closets.

2559. But, as a rule, are there water-closets to the smaller class of houses ; the 8*l.* or 10*l.* houses in towns with which you are acquainted ?—I do not think that as a rule there are.

2560. In all those cases are they cleaned out by the whole thing being carried away occasionally, or is there any water service by means of pouring pails of water down ?—They are carried away bodily ; everything, like water, except that which passes from the person is carefully excluded.

2561. Mr. *Wilkinson.*] My learned friend, Mr. Cripps, read a statement with regard to the waste preventers alluded to by Captain Tyler ; have you at all considered that subject ?—I do not know specially the special waste preventer which Captain Tyler is alluding to, but there have been several arrangements by which waste is prevented, and several cheap modes of preventing it. I think that in all cases where water can be wasted by negligence, it is desirable to introduce arrangements of that sort for the protection of the companies, and that they ought to be introduced at the expense of the consumers of the water.

2562. There would be no difficulty, as far as the mechanical apparatus is concerned, in introducing something which would be quite efficient ?—None whatever. I do not know that I can tell the precise mechanical arrangements, but I know various water-closets with arrangements by which the waste of water is prevented.

2563. There would be no difficulty in preventing waste from that source ?—That is so.

2564. As to the provision in case of fire, have you seen Captain Shaw's report ?—I have not read it ; I heard it partly read, but the subject of protection against fire has been one which has occupied my attention very carefully for the last 20 years.

2565. You know, of course, the system which is at present in use in London ; the plug system ?—Yes.

2566. What is your opinion of that system ?—It is a disgrace to our profession ; it is a disgrace to the mechanical ingenuity of the age that it should be allowed to exist. Nothing ever was so bad as the old wooden plug.

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2567. What would you suggest as an improvement?—I suggested long since, and have introduced very generally improved fire-cocks, which have been very largely used. I believe at present there are about 120,000 fire-cocks employed on a pattern which was introduced first in Manchester, by which immediate communication is had with the pipe, and which costs more probably after the whole expense is included, about 30 *s.* a cock. It is only suitable, I may observe, to the constant supply; it is not suitable for an intermittent supply.

2568. I need hardly ask you whether you concur with Captain Shaw in thinking that constant supply is necessary?—Yes; in almost all the cases where I am engineer the fire engine has been discontinued. The water is obtained direct from the main pipes almost instantaneously, and the fire engines are merely used as omnibuses, to carry the men and their apparatus.

2569. And with a system of constant supply, do you see any difficulty in introducing a system like that in London?—None whatever. I cannot understand the estimates which have been made and laid before this Committee. I see that an estimate has been made that it would cost 10 *l.* per hydrant, as it is called, and that 150,000 *l.* expense would have to be incurred in changing the hydrants belonging to the two companies. I should be very glad indeed if I were a contractor to undertake to change those hydrants at 2*l.* a piece, instead of 10 *l.*

2570. I do not know whether you have seen the plan proposed by Captain Shaw?—No; I have not seen it. My estimate is based upon the new fire-cock, which has been introduced in about 150 different towns, and about 120,000 of them are now in use; it is a cheaper thing than Captain Shaw's. It has been in use for about 18 years, and answers perfectly.

2571. *Chairman.*] Does your estimate include the cost of digging up the road and relaying the road?—Yes; everything. I have changed hundreds of them from the old wooden plug in Manchester, to one of a better construction, at a cost not exceeding 30 *s.*

2572. Mr. *Wilkinson.*] Will you tell me what that cost includes?—It includes the fire-cock itself, and the attachment of it to the pipe and the box, the street casing which covers it and protects it from injury. I see that I have here a drawing of it; it looks as if it was an humble apparatus of my own; it goes by the name of Bateman and Moore's patent, but it was invented principally by one of my own pupils, and I improved upon it, and for his sake I took out a patent which has been very successful, so far as its introduction generally has been considered. That is about 19 years ago, in 1847, and the patent has long run out, and therefore I have no interest whatever in it, but it has been very largely introduced. It consists of a vertical pipe coming from the main, or from a side branch with a swelled part, in which a gutta percha ball rises with the water and closes against the outlet; it has then two lugs rising from the mouth which enable a vertical pipe, called a stand pipe, to be introduced and attached, and then by screwing down a handle which has a cup at the foot of it, which fits the top of the ball, the ball is depressed, the water rises round the ball in the swelled part, passes up the hollow stand pipe, and so through the hose, and is thrown upon the fire. The attachment is simple, and costs very little to begin with. They are scarcely ever out of repair, and they have been in constant use now since 1848.

2573. *Chairman.*] You require a certain head of water, do you not, to make them available for putting out a fire?—Yes.

2574. Otherwise you must have an intermediate engine?—Yes; but as far as obtaining water from the pipes is concerned, it is immediately supplied, and where you have pressure enough you can do without fire engines.

2575. Mr. *Wilkinson.*] Is there anything else which you think should be brought under the notice of the Committee which I have not asked you about?—I do not know that there is. I should be very glad to answer any question which may be put to me, but I do not remember anything more at present.

Cross-examined by Mr. *Denison.*

2576. This scheme of Captain Shaw's, as I should guess, from what I hear of your

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your description, differs from yours?—It seems to be different; it is certainly different, but I do not know in what respect, without examining it.

2577. Between you two doctors we do not know which advice is best?—I do not understand it at present.

2578. You understand enough of it to see that it is different from yours?—It is different in the drawing.

2579. Yours has been in use 18 years, you say?—Yes.

2580. Therefore Captain Shaw knows it?—Yes; he knows it well.

2581. Therefore from old fashioned prejudice he does not adopt it?—I do not think there is any old fashioned prejudice in the matter.

2582. Perhaps, from a new fashioned prejudice, he may like something better?—I do not know; I have not seen Captain Shaw's pipe, therefore I cannot tell.

2583. With regard to the estimate of 10 *l.* a cock, whose estimate is that, do you know?—It is in Mr. Quick's evidence.

2584. Do you imagine that it is founded upon information from Captain Shaw, or upon imagination?—I do not know. It is the evidence given before this Committee, which I read this morning. I do not know what it is founded upon.

2585. You do not know whether it is founded upon good information, having relation to Captain Shaw's plan, but not to yours?—I do not know that, but I am sure it need not cost that money.

2586. But whether Captain Shaw's plan need cost 10 *l.*, you do not know?—No; but if the other plan is adopted it need not cost that money. Besides he did not refer in his evidence to Captain Shaw at all, and whether it had any reference to Captain Shaw's plan is not apparent from his evidence.

2587. If fire-engines are to be got rid of, what amout of pressure do you suppose must be put on constantly?—For not less than 80 or 100 feet. In fact that would not be sufficient in some places; for general buildings it would be about 150 feet, or from that to 200 feet would be a desirable pressure.

2588. Again, referring to Captain Shaw, who is the man responsible for fires, I see he talks of 300 feet; that is a slight difference, is it not?—That is not necessary. It depends upon the height of the building over which the water is to be thrown, and in some cases 100 feet would be sufficient, whereas in other cases 200 feet might be required.

2589. The Committee have his report upon the table, and Captain Shaw is the authority for fires?—Captain Shaw is not my authority for fires. I have had as much to do with providing against fires as Captain Shaw has had to do with it. I have had to provide apparatus for many more towns than Captain Shaw has, though I have the greatest possible respect for Captain Shaw and his opinion.

2590. You heard my learned friend's speech about Captain Shaw, did you not?—Yes; I heard him speak of him. I have the greatest possible respect for Captain Shaw's abilities and opinions.

2591. I am glad to find that your estimate of the strength of the pipe does agree with that which you say you received from some water engineer?—If so, there would be very few burst pipes in London under a constant supply.

2592. I am glad to hear that it is so. I cannot find amongst my papers how much a three-quarter inch pipe of that same scale ought to weigh per yard; I mean a three-quarter inch pipe adapted for a constant supply; can you tell me how much it would weigh?—About 10 lbs.

2593. Here is a bit of pipe which I have had given me; is that a 10 lbs. pipe (*handing a piece of pipe to the Witness*)?—I should think it looks like it; it is a very strong pipe.

2594. Is that about a 10 lbs. pipe?—I will not undertake to say.

2595. However, it is about the right thing?—I should think it was.

2596. Have you ascertained, among your other inquiries, what the actual weight of the three-quarter inch pipes commonly used in London is?—No. I said before that I did not know, but I am informed that the pipes commonly used in London are about the strength of the pipes which are commonly used in the country.

2597. Have you examined that for yourself?—I have not.

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2598. This is what they give me as a bit of the actual three-quarter inch pipe used in London (*handing another piece of pipe to the Witness*); just let the Committee see it; is that at all fit for a constant supply?—No; but that is a bit of gas pipe, I suspect, not water pipe.

2599. You say that is a piece of gas pipe; we shall have an opportunity of proving that it is not so?—I have no doubt that it is; it may be used for water, but it is intended for gas.

2600. In connection with that you say that the plumbers do this work, and that they are interested in making the pipes as heavy as they can?—I do not say that they have done so, but I say that if they are left to themselves the probability is, that inasmuch as they are paid by the weight of the pipe, they would not reduce the weight of it.

2601. In point of fact are the plumbers left to themselves in building London houses, or are not those things managed by the builders?—Very likely by the builders, but not by the Water Companies; my observation had reference to the Water Companies; the Water Companies ought to prescribe the strength of pipes to be used, and not the builders.

2602. That, I dare say, we should agree about, but I rather understood you to say that at first sight the present pipes in London are of the proper thickness, because the plumbers are interested in making them rather thick, and then you tell me, as a matter of fact, that the builders and not the plumbers regulate those things?—I did not tell you as a matter of fact; it is very likely it may be the fact, but I do not know.

2603. As to the regulations which the companies ought to have the power of making, I rather inferred from your bringing in the clauses in the Newcastle Act, that that is what you think is about the right thing?—Yes; I think it is; there may in that case be some alterations required, but I think it is about the right thing; I see there is no power of appeal in the Newcastle Act, it leaves everything in the hands of the company, and perhaps the public might require some little protection, which would not be injurious to the companies, but some little protection with reference to that.

2604. What sort of appeal would you suggest there?—It might be either to an officer to be appointed for that purpose by the Board of Trade, whose special duty it should be to make himself acquainted with what is necessary, or to some competent authority of that kind; it would not do to leave it to the justices, or to the ordinary way in which appeals are made, because the justices would know nothing about it, and would not know whom to apply to.

2605. In point of fact the Board of Trade seems to you to be the best authority?—Not the Board of Trade generally, as the Board of Trade, but as appointing a special officer for the determination of any question which might arise in dispute.

2606. That is practically what they do, is it not, in matters that are entrusted to them; they have officers for different purposes, some for railways, and some for other purposes?—Yes; but it is too much to expect that an officer of the Board of Trade should be competent to deal with every question of detail which might be referred to the Board of Trade; it requires a sort of special education and special attention to one particular subject.

2607. Would a Captain Tyler kind of man suit you?—Yes; but he would very likely be too good a man for the purpose, because his time might be employed upon questions of greater interest; he might not have the time to give to it, but a competent person, thoroughly trustworthy, might probaby be appointed.

2608. Is there any other modification in the Newcastle Act which you would suggest besides that?—No, perhaps not; but I am not quite sure that the Newcastle Act provides sufficiently for the summary conviction of offenders. I think that that is very necessary; there ought to be no escape for offenders, nor any dilly-dallying; the punishment ought to be prompt and quick; I am not quite sure whether it is sufficiently summary in the Newcastle Act.

2609. The rate of penalty for the first offence is 5 *l.*; that is, perhaps, adequate for the first offence?—Yes; those clauses in the Newcastle Act are very good, and they meet, I think, most cases where it is required to give a great authority to the companies which they ought to have; the only material provision which I

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would recommend in addition, would be that the public also, to some extent, should be protected by some kind of appeal.

2610. Just a word about Manchester: things are going on very smoothly there now, apparently; there is no water wasted, you say?—They always have gone on smoothly, as far as the water is concerned.

2611. There is no waste?—Very little, as compared with other towns.

2612. Are the Corporation satisfied?—Quite.

2613. Somebody has given me a bad description in the shape of a threatening notice from a friend of mine, Mr. Joseph Heron, the Town Clerk of Manchester, complaining that people will waste the water: "The Waterworks Committee find, from the reports of their inspectors, that water is wasted to a very large extent, in consequence of the practice extensively prevailing of leaving continually running the taps inside the houses, and even from the cisterns; the effect of this improper waste, is to interfere with, and, in fact, in many cases, to prevent the occupiers of houses in the adjoining and other districts obtaining the supply of water which, under other circumstances, would be enjoyed, and is in many cases found to be the cause of the complaints now frequently made of a want of water; the Waterworks Committee therefore desire, both on their own account and for the sake of their neighbours, to caution the inhabitants against the practice referred to, and in order to secure to the inhabitants generally, as far as may be possible, a supply of water, the Committee have given instructions that all parties who may be found to be wasting the water in the manner before described, shall be proceeded against for the recovery of the penalties to which they thereby make themselves liable under the Corporation Waterworks Act. By order, Joseph Heron, Town Clerk." This is dated as late as the 17th of last January, is it not?—I do not know anything of that, but it is a very proper notice to issue from time to time, even if the waste were very inconsiderable; it is a sort of thing which all large companies ought to carry out; it is the way in which the thing is kept in good order; but I give you the facts as to the quantity of water used, and, so far as I hear, I have heard no complaints; I have received none myself, but I have not the management of the distribution.

2614. Is Mr. Heron coming here to back you up?—Not that I know of.

2615. I had the pleasure of seeing him in the gas-room, and thought, perhaps, he might come to back you up in the water?—I hope I do not require backing up in this case.

2616. I want to know whether you will not accept that explanation?—No; it is very possible that there may be districts where there is waste. We introduced a higher service about that time, about the beginning of this year.

2617. What do you mean by higher service?—Up to that time we had two zones for supply, but the demand upon our pipes has been gradually increasing until there may have been in that district a difficulty in meeting the demand.

2618. Do not you know that there was?—I do not know that there was, except that I take that as evidence to this extent. I know that there was a difficulty in keeping up the full pressure there, but I do not know that anybody was short of water. They had been taking water from a higher service reservoir, and introducing it to higher points, to more distant points, for the purpose of giving in those parts of the immediately surrounding district a better pressure; and that notice would be issued just about that time, or a little before it, perhaps.

2619. Now, have you done guessing?—No; I have not been guessing at all.

2620. The Committee can judge of that, but do you believe that Mr. Joseph Heron stated this as a fact, that this waste had been discovered without having ascertained it to be a fact?—No; but if it had been discovered in 20 places, which would be a very small number, it would be very proper to issue a notice of that sort.

2621. In this pamphlet of yours, which has been put in, you talk about a vigilant inspection, and even security being required, do you not?—Yes.

2622. At the bottom of page 10, the phrase occurs; people have different notions of the meaning of words; do you think that people in London would be very much inclined to submit to what you call severity?—If it is necessary in order to correct an evil habit, it ought to be adopted.

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2623. You see we have got people to deal with here who have heard more than complaints, they have heard that which you have proposed, and you propose a system of what you call "the most persevering attention, and indeed severity"; do not you think that possibly there might be a good deal of remonstrance?—That would not signify; it would only be a remonstrance on the part of those who deserve to be severely treated.

2624. The Bill must be passed by Parliament, and a Bill may be passed, upon your evidence, recommending vigilance and severity?—The Bill would not recommend severity, but the Bill would give summary power in the hands of the proper authorities to deal with parties, not otherwise amenable to the law, by treating them severely in the way of penalties or otherwise.

2625. Whenever a Bill of this sort was introduced, people would naturally say, you are bringing in a Bill founded on Mr. Bateman's evidence, and Mr. Bateman says that it cannot be worked without severity?—Nevertheless, it is necessary to be severe with criminals; you cannot keep the peace of the country without occasional severity; and so, if you cannot introduce a good supply of water for the benefit of all without cases of occasional severity, you must have recourse to severity.

2626. Do you think that the term criminal, for which I am obliged to you, will be forgotten when the time comes?—I am quite content that it should be remembered; I only use it as an illustration.

2627. At Chester you say they failed, because they were old fashioned?—Yes; they are rather old fashioned there.

2628. In fact they are old fashioned and good-natured, not severe?—That is so.

2629. At Glasgow, are they old fashioned there, too?—In some respects they are; but it is not from old fashionedness there, but from the cause which I have mentioned, that nothing can be worse than the plumbing in Glasgow as I explained, and if the habits of the people required severity to correct them, they would not be disposed to exercise severity to the full extent; that is my opinion upon the matter.

2630. You do not pay the London plumbing a very great compliment?—No; as far as my own knowledge of the plumbing in London goes, it is about equal to Glasgow.

2631. This which happened at Glasgow, is a specimen of what naturally does happen where severity is employed, I suppose?—No, not necessarily; Newcastle-upon-Tyne is an instance where severity has not been employed, and where there has been a saving by the introduction of better arrangements, and there the quantity of water consumed is not one-half what it was before the introduction of better fittings without severity.

2632. What were all those clauses but severity?—Such clauses as those ought to be introduced for the benefit of other companies, but by the aid of those clauses, severity has not been required to be practised at Newcastle.

2633. In fact, Glasgow is a specimen of what naturally does happen where stringent measures are applied?—Yes; that is so.

2634. And Chester is another instance of what happens where there are not stringent measures?—Where a persevering determination to reduce the consumption and to put everything in the best order is not carried out.

2635. Those are longer words, but they mean much the same thing, do they not?—No; not quite the same thing.

2636. After reading to you all those questions which my learned friend did read, taken from a printed list of recommendations, he asked you whether you agreed with this; whether the foregoing alterations would not require such and such a cost, and you said that they would not; what you meant was, that the things recommended were not necessary, was it not; cisterns for instance?—Cisterns are not necessary.

2637. Of course if cisterns are not necessary, such a cost would not be necessary?—No.

2638. You do not mean to find fault with the estimate for cisterns, where they are necessary, do you?—I have not gone into the matter, I confess; I should think it is a widest range from 5 *l.* to 10 *l.*, that might cover the first cost in a new building; but then you know the cisterns are existing in most cases.

2639. Not

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2639. Not in those small houses?—In those small houses I would not introduce cisterns at all.

2640. If Parliament goes on thinking as it did in 1852 that cisterns are necessary, then you do not say that that cost is an unreasonable one, do you?—For small houses, yes; I think that for small houses the cost need not exceed 2 *l.* or 3 *l.*

2641. Will you be kind enough to tell us what you would recommend in the way of machinery for small houses?—Under the constant supply system you would not want a cistern, and, therefore, I should put out the cistern altogether; but the whole cost, exclusive of the cistern, including the water-closet, except the apparatus of the water-closet itself, need not amount to more than 1 *l.* or 2 *l.*

2642. *Chairman.*] You were asked what amount you would propose for the smaller class of houses in London, under the constant supply system; will you be so good as to answer that question?—Under the constant supply system, I would propose merely a communication pipe, with as many taps as might be required for the accommodation of the house, and nothing more, except that where a water-closet is introduced, there should be a cistern to the water-closet, and that cistern should be upon the principle of preventing waste.

2643. That is to say, one of those things which is called a double valve service, or its equivalent?—Yes.

2644. What do you estimate the expense of those fittings which you would propose; we will assume, in the first instance, that the communication pipe exists and is strong enough not to need to be replaced?—Then it would require merely the attachment of a tap, which would be about 2 *s.* or 2 *s.* 6 *d.* at the most, or 5 *s.* would do the whole; if the communication pipe were itself sufficient, 5 *s.* would do for each cottage.

2645. Mr. *Denison.*] That is assuming no cistern to be required?—Yes; assuming no cistern to be required, and assuming the pipes to be strong enough.

2646. *Chairman.*] Do you assume that there is no water-closet in the house? —That is merely to answer your question; assuming the pipes to be sufficient, the cost of merely changing the system, exclusive of the water-closet, would be about 5 *s.*, and a water-closet would cost about 1 *l.* more.

2647. To put in this double valve?—Not the closet itself, but to put in the cistern which is required for it.

2648. Would that be for introducing in lieu of the existing cistern a double-valve cistern?—Yes; the cost of that cistern for the special service of preventing waste is, I believe, 17 *s*. 6 *d.*

2649. Mr. *Denison.*] Is the cost of fixing included?—That would be a little more; 25 *s.* would cover it; that added to 5 *s.* would make it 30 *s.* for each house.

2650. 30 *s.* for the cistern and the fixing?—Yes; 30 *s.* for the cistern, the fixing, and a fresh tap.

2651. That is assuming that everything is suitable for fixing, which very often it is not?—Yes; there are cases in which you must add something to that; 2 *l.* a house would be quite sufficient upon the average of all small houses.

2652. Your animosity against cisterns seems to increase with age, does it not?—I have no animosity against cisterns; I only say that cisterns are not necessary under a constant supply for small houses, and I would not introduce them.

2653. Somewhere or other in this report about Glasgow you say that the use of cisterns is indispensable; I cannot find out exactly at what date you said that?—I will give you the date; it was about 1856, I think.

2654. Then you are eleven years older than you were in 1856?—Yes.

2655. In this report of 1856, if that is the right date, I see you say, "The use of cisterns is, I believe, indispensable at present, and, under any system of supply they are attended with so many advantages and conveniences that it may frequently, perhaps generally, be desirable to retain them; under constant supply, cisterns are not absolutely necessary, except to water-closets, but, as they have the effect of lessening the pressure, the waste from bad taps and imperfect fittings is reduced by their use if they themselves are properly fitted up with unexceptional

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unexceptional ball-cocks to shut off the water when the cistern is full; if this is not attended to, the water, which may pass off unperceived from the waste pipe of the cistern, may be very considerable, and as the cisterns are frequently placed on roofs and in other inaccessible places, they are not easily inspected, and are never visited except in cases of necessity?"—That is exactly what I say; I do not think I am wiser now than I was then.

2656. Again, I see at page 10, just before that you say, "But where a change has to be made from the intermittent to the constant system, very great waste is commonly the result," and it requires the utmost vigilance?—Yes.

2657. Then comes the severity passage?—I do not know about the severity passage.

2658. Mr. *Kekewich.*] Would you recommend one large cistern for a block of houses?—In many cases that would be very desirable if cisterns were necessary at all.

2659. Have you seen that plan often adopted in the course of your experience?—I have had very little to do with the intermittent supply system; certainly 1,800,000 people out of the 2,000,000 whom I have had to supply with water have been supplied under the constant system, therefore I have had so little to do with cisterns for small houses, that I can only give a general opinion upon it. I have no doubt that it would be desirable, in many cases, where cisterns were required.

2660. In the case of two houses built together, belonging to the same landlord, which is very often the case, would not it be possible to have one cistern to supply the two water-closets and thereby diminish the expense?—No doubt.

2661. *Chairman.*] Not introducing the double valve apparatus?—I think that every water-closet ought to have its own cistern, if it is supplied upon the self-regulating system.

2662. Mr. *Denison.*] This self-regulation arrangement requires a cistern to each water-closet?—Yes.

2663. *Chairman.*] We understand from you that you think it would be necessary with the constant supply system that there should be a double valve to each water-closet?—Yes; or an equivalent by which the water should be prevented from being wasted; something which should prevent the waste of water becomes necessary and desirable, because as water-closets are, they do waste, if improperly constructed, an enormous amount of water.

2664. Mr. *Denison.*] I think you told me last year, when I was examining you, that you boasted of being a Manchester man?—I am not a Manchester man, but I lived many years in Manchester.

2665. I see that you vouch for the honesty of Manchester, and we will assume that Manchester is honest. At the same meeting of the Social Science Society where you read your paper, Mr. Beggs read a paper, did he not?—No; Mr. Beggs read a subsequent paper, but I was not present when he read his paper.

2666. Do you know Mr. Beggs' paper?—Yes; I know the paper; I cannot carry it in my mind, but I have read the paper.

2667. It is in the same pamphlet as your paper at page 24. Mr. Beggs said: "This is the vital question" (that is about the waste, and so on); "the one which includes the other question involved in a water supply for London, and we shall be all the better for looking at it boldly. In London" (you observe he says London and Manchester), "it is well known that the negligence and dishonesty as to brass fittings are most flagrant. For the sake of a copper ball, or a brass service-cock which may be sold for a few pence, they will be torn from their places, the other parts of the service seriously damaged so that the water runs to waste, and so continue for days until detected by an officer of the company. An intelligent audience would scarcely give credit to a report, if such could be made, as to the extent of mischief of this kind." Do you agree with that?—I have no means of disagreeing with it. I hear that stated to be so, but it surely cannot apply to all the houses of respectable artizans and mechanics of London. It must be confined to very limited districts, and there I should not give them the chance of stealing them. I would put them a wall-plate or a stand-pipe in the street of a kind which would not be worth carrying away if they

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even did steal it, or it should be so fixed that they could not steal it, so that they should always have the water, but should not have the inducement to steal it.

2668. *Chairman.*] Then that would not be bringing the water into each house?—No; I think there may be many districts with inhabitants of that description where it might not be safe or proper to introduce it, but the inconvenience would not be very great of fetching their water across a court-yard.

2669. Would those double-valved cisterns enable an ordinary necessary to be flushed by a mere turncock without all the apparatus of a water-closet?—I should think a simple arrangement might be made for doing it.

2670. Mr. *Denison.*] I hear something which will horrify you, that even in Manchester they are obliged to chum the butts up to prevent them from being stolen?—That is possible; there are dishonest people all over the world.

2671. Is that found to be necessary there?—I do not know; what kind of butts do you mean?

2672. You say that the companies ought to have those powers; probably we shall agree with you in that, if in other things we do not; but how do you propose the initiative to be taken; you see that under the present system the inhabitants, or a certain portion of them, must put themselves in motion?—I would destroy all that; I would make it absolutely incumbent upon the Water Companies, armed with proper powers for their own protection, to supply a constant supply within a limited time.

2673. Clearly the constant supply must follow the fittings, being in a proper condition? —Clearly so; and I would give the companies full power to see that all the fittings were in a proper condition before the constant supply was given.

2674. I can understand that they may have the power to refuse the water, but is that the remedy which you propose, that they are to give no water to any people till their fittings are right?—That is a remedy so far as those individuals are concerned.

2675. Supposing they were to say that they did not care for the water, you know that at Manchester everybody has to pay whether he takes the water or no?—Yes; that is one of the difficulties of companies having to deal with so large a place as London; it comes to a question whether the companies ought to be here at all or not.

2676. But here you have the companies and they cannot get out of existence very well; assume the companies to be here, and just tell us what is the course of action to be taken to secure the fitting being put in good condition, and so make people have water where they ought to have it without wasting it?—I should make it incumbent upon the companies to give a constant supply within a limited period; I would give the companies full power to refuse water to everybody who had not their fittings in proper order, and summary powers, or at least the means of putting into action summary powers, for the punishment for those who stole water or sold it.

2677. That is not all, is it?—That would be sufficient; of course the companies have to be protected, it is an unfortunate position where the interests of the consumers and the proprietors are antagonistic as they are in the case of supplying water; everybody ought to have the command of the water.

2678. Mr. *Kekewich.*] Under the local Acts of Parliament for supplying those towns you have mentioned with water, inspectors are appointed, are they not? —Yes; inspectors are always appointed.

2679. Are they appointed always by the companies, or by the authorities of the town or borough?—The companies would for their own interest, and do for their own interest, appoint inspectors; but water companies are rapidly disappearing almost universally, and waterworks are now being purchased by Corporations and the distribution is carried out by them.

2680. *Chairman.*] If the constant supply system were established, would your turncocks be released from their duty?—All the men now employed for turning the water on and off would be released from that duty, and they might be converted into inspectors. Under the constant supply system, very much less duty is required, and a smaller number of men would be employed than under the intermittent system.

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2681. Except for purposes of inspection?—Except for purposes of inspection, and for scouring out the dead ends of the pipes, in order to keep the water fresh.

2682. You are not prepared, are you, to give us the name of any town which affords an exact parallel to London in its circumstances, so far as the size of the town extends?—No; not within my own experience. Taking all circumstances into consideration, I hardly know any town under parallel circumstances. I think, probably, Glasgow comes the nearest to it of any town with which I am acquainted.

2683. Have they complete water-closets in Glasgow, that is to say, with the whole apparatus of a water-closet?—Yes; but Glasgow is again different, from their habit of living in flats or layers of houses, as it were, one above another, which absolutely necessitated the introduction of water-closets there, and that is not to such an extent carried out in London, therefore the circumstances are different. I do not know any town quite parallel to London.

2684. Then we are to ascribe the greater waste of water in Glasgow to the general existence of water-closets, especially amongst the lower classes of the population?—Yes; and to their general wasteful habits and bad taps. I have a return before me here of the number of bad taps, the per-centage, and so on. It is quite a recent return; and it is quite shocking the manner in which things are conducted there, and the waste from the cisterns which is effected by means of deafeners without the knowledge of the people.

2685. Are the cisterns there only over the water-closets?—Glasgow having been originally a town, under the intermittent supply, the cisterns existed almost wholly over the water-closets.

2686. Therefore Glasgow has not adapted itself in that matter to the constant supply, as a rule?—It has been more so since the introduction of the Loch Katrine water, with all new houses and all the extensions, the people accommodate the buildings to the new condition of things.

2687. In those cases, on each floor, are there mere taps without any cistern?—Yes; and that will be so to a very great extent in future.

2688. Therefore, you have in Glasgow very much the condition which you would have in London if you suddenly changed from the intermittent to the constant system of supply?—Yes; I think so; I think that Glasgow is the nearest approach to a parallel case.

2689. Have they tried in Glasgow the system of ferrules with the view of preventing the enormous waste from the cistern?—No; I do not think they have.

2690. Or the system of a double valve chamber over the water-closet?—They have gradually been introducing changes into the water-closets, and they have made very considerable improvements.

2691. Has that had any sensible effect?—Yes, it diminished the water for a time, but then nobody took any interest in it, and Mr. Gale, the engineer, relaxed his efforts, and the thing is going on pretty much as it was; so long as they had something like 30,000,000 gallons of water a day more than they actually require, and which will cost them nothing but a little extension of piping, they do not feel it; therefore they allow it to go to waste.

2692. Is it your opinion that you cannot reduce the waste at Glasgow without introducing the ferrule into every cistern used for the purpose of domestic supply, and the double valve chamber into every water-closet?—I will not say that; but the present consumption per head in Glasgow is about 50 gallons, and I have no doubt whatever that persevering efforts to reduce the consumption, to economise the water, and to introduce the best class of fittings, would reduce the consumption, certainly, to 30 gallons per head. I am quite sure that 20 gallons per head might be saved in Glasgow after a lapse of a couple of years, which would be required to carry out the necessary operations.

2693. When you speak of introducing the best class of fittings, in what way do you mean introducing the best class of fittings?—By taking out the objectionable ones, and putting in fresh ones.

2694. In what part of the system; do you mean taps, ball-cocks, or what is your view?—Everything; I have here a report, dated September 1864, and at that time, which was about two and a-half years after the introduction of the water from Loch Katrine, out of a total of 165,000 water fittings of various kinds

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kinds which had been examined, 67,000 were not approved of; 41 per cent. of the old water fittings at that time were objectionable fittings, and they were gradually removing those objectionable fittings and they were introducing better ones.

2695. You think that it would be necessary to prescribe the pattern of the fittings, and if plumbers generally are employed, to compel them, under penalties, to use them according to that particular pattern or standard?—Yes; I should seek for power to license plumbers; I think that some addition to the Newcastle Clause might be added to that effect, to license plumbers, who should be compelled to use such fittings as might be prescribed by the companies or by the Corporation, and that nothing else should be allowed.

2696. Mr. *Benyon.*] If the companies were to prescribe the weight of the pipes, the nature of the fittings, and so on, of course the expense would be upon the consumer?—Yes; but the consumer would have a great advantage in getting a constant supply instead of an intermittent supply.

[The Witness withdrew.

INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Wednesday, 5th June 1867.

MEMBERS PRESENT:

Mr. Ayrton.	Colonel Hogg.
Mr. Henry Baillie.	Mr. Kekewich,
Mr. Benyon.	Mr. Sclater-Booth.
Lord Frederick Cavendish.	

ACTON SMEE AYRTON, Esq., in the Chair.

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Mr. *Cripps* stated that as he understood that the report of Captain Tyler was taken as put in, he would not trouble the Committee with further evidence upon the points to which it related.

Alexander Ramsay, Esq., sworn; Examined by Mr. *Cripps*.

A. Ramsay, Esq.

2697. I believe you are the Manager of the Edinburgh Water Company?—I am.

2698. And have been so for the last 23 years?—Thereabouts.

2699. Before the year 1852, did that company supply upon the intermittent system?—It did.

2700. In 1847 was your new Act obtained which gave you five years, and after that you were to supply upon the constant system?—Yes, from five years after the passing of that Act we were to supply upon the constant system.

2701. So that 1852 was the time when the constant system came into operation?—Yes.

2702. In making that change, what expense did you find it entailed upon you as a company?—I think we laid out in enlarging our mains, and other expenses in one way or another, some 10,000 *l.* or 12,000 *l.*

2703. Your supply at Edinburgh is a supply entirely by gravitation, is it not?—Entirely.

2704. The water is not mechanically raised at all?—No.

2705. Had that been so before 1852?—From the commencement of the company in 1819 it had been entirely so.

2706. And since that time, since 1852, have you been supplying and going on upon the constant system?—Yes, with a few occasional unavoidable exceptions arising from excessive droughts. In the year 1864, three years ago, the drought was most excessive in Scotland, and the consequence was, that our reservoirs in the hills got almost all emptied, and we were obliged to reduce the delivery; we were not able to go on with it.

2707. Then at that time did you give a supply at different times of the day less than constant?—Yes, we distributed the supply in the best way we could, but it was not a constant supply.

2708. Since the change has taken place in Edinburgh, in your opinion, has the

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the system been very much more approved than it was before; has it been altogether better?—Yes, very much indeed.

2709. And having tried the two systems, are you yourself very much impressed with the advantages of the constant system?—No doubt; no one can have any experience of it without being able to appreciate those advantages, I think.

2710. There are difficulties, as we all admit, to be overcome, with reference to the prevention of waste?—Yes.

2711. What do you say with reference to those difficulties?—I do not think, as a common rule, that constant service is practicable, unless a company has some very stringent power over the house apparatus.

2712. And you think that that is right and proper to be given as a part or an accompaniment of the constant service?—I think if you mean to maintain a system of constant service, it is quite indispensable.

2713. Do you think, supposing the fittings to be proper, that there is any greater waste or any greater consumption of water by the constant system than there is by the intermittent system?—No; I think with a proper control over the house fittings, and proper supervision in every way, you can give a constant supply of water with a smaller quantity than you can give a full intermittent supply.

2714. When you first changed to a constant supply, I believe you had no regulations then which enabled you to insist upon improved fittings being put in?—The whole power we had in that respect was the power granted under "The Waterworks Clauses Act, 1847," and those powers are very small.

2715. In fact your Act must have been obtained in the same year as the Waterworks Clauses Act?—Yes, the Waterworks Clauses Act passed in April of that year, and I think our Act passed at the end of June or the beginning of July. Although the General Act was only six weeks old it was incorporated with our Act.

2716. And those were all the powers you got at that time?—Yes, up to that time.

2717. Did you after that institute more strict supervision to prevent waste, after the change first took place?—Yes, greatly more. We were forced to do it or we could not have maintained the system of constant service at all. We were obliged to keep up a very strict inspection to prevent the waste from the water-closets. The people in Edinburgh, as in most large towns, have a habit of fastening up the handles of water-closets, and allowing the water to run through for days and days; and the waste there was quite enormous. We have now a staff of officers whose business it is to make inspections regularly, and prevent waste arising from that source or any other source.

2718. Have you introduced any apparatus for preventing that waste from water-closets?—Yes, we got additional powers in 1863 when we were before Parliament, and we have introduced a better system of cocks and taps, but we had had a great difficulty in getting them introduced. We have a class of men, I mean the plumbers, in Edinburgh, who resist every kind of improvement in water apparatus. I will show you the improvements if you will allow me (*producing certain taps*). I think this apparatus was before the Committee yesterday, but I want to show it for another purpose. Anyone looking at that tap would have a difficulty in discovering that it would leak when you bring it into use; it would not only leak, it would pour; the water would stream through it, but there is nothing in it visible to the eye that would convey that idea from a mere inspection.

2719. Mr. *Denison.*] The idea of what?—The idea of waste and leakage. In order to get rid of that, I tried for a great many years to introduce this system of tap (*producing another tap*).

2720. That is the screw tap?—Yes; a loose valve screwed down. This is as cheap as the other; the only repair it ever can want is the replacing of these leather washers, which is a very inexpensive process, but the plumbers in Edinburgh, and I suppose in other towns as well, are so very averse to their introduction that I have found, in several instances, in putting them on, instead of putting the tap down they kept it screwed up, and in attaching this by hot solder to the tap, the leather gets scorched, and that ruins the tap. Then they appeal to the consumers, and say, "You see this will not do, it is leaking already,"

already," when they have themselves destroyed it. That is one of the difficulties we have to contend with; but in order to show, by a convincing proof, what the waste of water from a very small source is, I had these discs constructed a few years ago; they are all decimals of an inch; that is ·05; you can see through it if you look, and I had this tested to ascertain what quantity of water would pass through these discs in 24 hours, under given circumstances of pressure. I found this one, ·05, will deliver 1,613 gallons, with a pressure of 150 feet, in 24 hours.

2721. *Chairman.*] That is the 500th part of an inch?—No, the 20th part of an inch. That gives one some idea of the quantity that may be discharged from these larger ones. Perhaps it is as well to give the quantities in each case. This one, the size of which is ·05, with 150 feet of pressure, discharged in 24 hours 1,613 gallons.

2722. With what head of water?—One hundred and fifty feet. Then the next one is 1–10th of an inch; that discharges, in the same time, with the same pressure, 2,380 gallons in 24 hours. Now, going on to the others, I could not maintain the pressure in these experiments. I have got it down to 120 feet in 4-10ths of an inch in the case of this disc (*showing it*); and through that there passed, with a pressure of 120 feet, 34,280 gallons. That may give one some idea of the loss of water from leaving a tap open for a very short time. That was the object I had in view in constructing these discs.

2723. Mr. *Cripps.*] Then at the present time you say you have not sufficient power; what is your consumption per head in Edinburgh?—Just now we are up to 35 gallons per head per day.

2724. Mr. *Baillie.*] That is a very large supply?—Yes; it is very large.

2725. *Chairman.*] Is the service on day and night?—It is on day and night, constantly; it is never off.

2726. Does that 35 gallons per head per day include all supply??—It includes the supply for every purpose; we have arrived very nearly at the quantity consumed for purposes other than those of domestic use, and it amounts very nearly to 14 per cent.

2727. Mr. *Cripps.*] What do you estimate that your consumption will be, or would be, if you had the power of taking proper means to prevent waste?—The consumption, with a supply equally full, and I believe most satisfactory, would be reduced to something like 18 gallons per head; not exceeding 20 gallons at all events.

2728. Mr. *Kekewich.*] Do you say that if you had a control over the apparatus you could reduce the supply from 35 gallons to 18 gallons per head per day?—Yes; give me the proper control over the apparatus and I would reduce it immediately from 35 to 18 or 20 gallons per head.

2729. *Chairman.*] What power would you require for that purpose?—The power of prescribing the description of apparatus and taps to be used.

2730. How would you exercise that power?—We should take care that no water was supplied when the taps were not of the proper description.

2731. Colonel *Hogg.*] But then a person could leave that tap open, and the water running as well as the other, could not he?—No; this requires two or three turns to open it fully out so (*describing it*), but it has another most important advantage over this one; in order to shut the water off this, it requires a half turn only to open it out, and the shutting of it quickly produces a shock in the interior of the body of the pipe; that shock disturbs the lead, and by and by that pipe gives way, and you have a flood; in this again there is not the slightest shock; it is screwed down so gently that there is not the least shock upon the pipe.

2732. Mr. *Kekewich.*] In answer to a question by the Chairman, you said you must take care that the proper apparatus and taps were used; how would you take that care?—We should take care that the house was examined constantly, to see that it was supplied with the proper apparatus and taps.

2733. By constant inspection?—By constant inspection.

2734. *Chairman.*] If in any case on inspection you found repeated derangements, you would cut off the supply?—We should give them notice; say three days.

2735. Mr. *Kekewich.*] You would give them a three days' notice to set it right?

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right?—Yes; and if it was not done then, we could not afford to go on; we must cut off the supply.

2736. *Chairman.*] You propose in the first instance to prescribe the exact form of tap to be used?—No, not the precise form, because there may be an improvement upon that.

2737. Then you could prescribe the improved form?—I would scarcely even do that; I would exclude the objectionable form of tap most rigorously. You should lay down what you would not permit, rather than what you would permit.

2738. Mr. *Cripps.*] Have you found that the supervision and inspection at Edinburgh has given rise to dissatisfaction or complaint?—No, we do not have people complaining that we inspect; our officers are sent more to make inspections for people who are disturbed by the noise of the water rushing in; they send to us to have it examined into.

2739. You do not find that people object at all to have the apparatus inspected to see that it is in proper order?—No, as a rule, we do not.

2740. Mr. *Baillie.*] Have you the power of inspection at Edinburgh?—Yes, we have the power of inspection, but our power ceases there; we have very little power beyond that.

2741. Mr. *Cripps.*] I think you said that you had the power of inspection, but not the power of objecting to any particular fittings?—Yes; but the power is so indistinct and imperfect, that it is a difficult thing to operate upon.

2742. Mr. *Denison.*] Have you your Act here?—No.

2743. Mr. *Cripps.*] With reference to what you stated just now, let me ask, in your opinion, supposing the communication pipe were sufficient to stand the pressure upon the intermittent system, need there be any greater pressure upon that pipe for the constant system?—There would be a difference, but I think the difference would be amply compensated in another way; when you turn on the water at the main, the shock of the water rushing in with great force into the interior of the pipes weakens it.

2744. You mean upon the intermittent system?—I mean upon the intermittent system; the water rushing in weakens the pipe and distends it; that is avoided by a constant steady pressure, but that difficulty about the distention of the pipe is still further increased by this tap (*pointing to a tap*), and you get quit of them both by using this one.

2745. In your opinion, is what gives what you call the shock to the pipe more damaging to the pipe than a constant pressure upon it would be?—I think it is; at all events in Edinburgh we found no difficulty in introducing the system of constant service; I have no recollection of ever hearing of any alteration requiring to be made to repair a house pipe for the constant service at that time.

2746. You speak of the time at which the change took place, and you say that the fittings which had been used for the intermittent system, went on the same for the constant service?—Yes, without change.

2747. Then you were supplying for some time with just the same fittings as they had before for the intermittent service?—For a long time, and they still are the same in a great many cases.

2748. Now, supposing a change to be necessary, have you formed any opinion as to the cost at which the change might be effected?—In introducing water for the first time into a house, you can introduce it at less cost on the principle of constant service, putting in proper apparatus, and the expense of maintaining that apparatus is very much less indeed than the cost of maintaining the ordinary apparatus.

2749. That is with reference to new houses; of houses which are unsupplied?—Yes.

2750. But I was asking, supposing a house to be already supplied with apparatus for an intermittent service, have you formed any opinion as to what the cost would be to put what you would call the proper apparatus for constant service into it?—I could not give any idea which would be generally applicable. In Edinburgh we have a vast extent of apparatus, much more, I think, than in any town of the same character. I know the number of water-closets in use is enormous, and perfectly incredible; there are baths in the houses, even in houses of very low rents indeed, and the expense of the alteration would depend upon the present condition of the house fittings, and the character and extent of the apparatus in use.

2751. *Chairman.*] When the change was made, did you dispense with the use of cisterns to any extent?—We had no power to enforce it.

2752. As a matter of fact, was the use of cisterns dispensed with?—No, they are in use now.

2753. Then the constant supply goes now into the cistern, and is drawn off out of the cistern?—Yes; I have recommended, however, in a great many cases, where it could be done without inconvenience, that it should be dispensed with.

2754. Mr. *Cripps.*] You are speaking now of houses already fitted for the intermittent service?—Yes.

2755. Supposing you supply water, for the first time, to a house which has not had a supply before, or, supposing you supply water to a new house, do you then have cisterns?—We take care then that there is a proper apparatus put in of this description that I have been speaking of.

2756. My question is, when you are going to supply water, for the first time, to a new house, or one that has not had water before upon your present system, should you put in a cistern in that case, or not?—We do not object to the cisterns being put in, in fact, we have no power to object to them, but in the case of water-closets a cistern is indispensable, and we must have it.

2757. *Chairman.*] In regard to the older houses, what is the character of the apparatus?—It is very ill constructed generally; I must say these water-closet cisterns, and the apparatus connected with them, are generally not too large; the water there is run off with great force, and very suddenly, and a very small quantity of water in that case is sufficient; but when a cistern is erected in a house for the common purposes of the house, and the water is let down into the water-closet by a small pipe, they very often keep it running there for ever; it does no good, they have an idea that it cleans the drains, but the effect of it is only to fill the house with bad air.

2758. Mr. *Cripps.*] Take the case of a poor tenement, to be supplied for the first time with a constant service, what is the expense in the case of that house?—I have no idea; it depends upon the character of the house altogether.

2759. Take a house, the rental of which is under 10 *l.* a year?—You could supply the house with a water-closet, and a small cistern for the water-closet, and a single tap of this description (*pointing to a tap*) placed in a convenient situation, I should think for not over 2 *l.*; of course it depends upon the distance from the main.

2760. I am speaking of what the expense of the apparatus would be, and the cost of putting it into the house in the first instance?—I think you could get a water-closet complete, introduced with a cistern for something like 34 *s.* or 35 *s.*

2761. I am speaking of tenements of 10 *l.* a year and under?—The cistern and pipe and altogether, would make it up to 2 *l.*, unless the mains are at a considerable distance.

2762. Colonel *Hogg.*] Do you mean to say that you could supply the whole of the apparatus, the water-closet, the pipes, and the pipes of communication, and the cistern for 2 *l.*?—For 2 *l.* 10 *s.* perhaps; it would be an iron cistern you know.

2763. *Chairman.*] You mean a very small iron cistern?—An iron cistern to hold probably, five or six gallons of water.

2764. That being constantly supplied?—Yes, on the usual system, with double valves, so that after letting out the water in the cistern, you cannot get any more till you let go the handle, and it fills again.

2765. Colonel *Hogg.*] Do you include the pan and everything in the figure you gave?—It is not a pan exactly that I am speaking of, it is a vessel made of crockeryware with a bent pipe and a knee upon it, going out into the drain.

2766. Mr. *Kekewich.*] A self-acting one with a plug to pull up?—Not a plug, a handle to pull down; the water continues to flow as long as there is any water in the cistern, and the handle held down, but when the cistern is empty you require to have it filled again before any more water flows.

2767. Mr. *Cripps.*] You said that the entire cost would be 2 *l.*?—£. 2 or 50 *s.*; I meant the original cost.

2768. The cistern for a water-closet of course would be the same or even more expensive with the intermittent system?—Yes.

2769. I want

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2769. I want to make this clear; I do not know whether we misunderstand you; do I understand you that in those 2 *l.* would be included the whole of the water-closet, so far as it depends upon plumbing or crockery at all?—Yes, the whole of it.

2770. Not the mere water supply-pipe and the cistern to it?—No, there would be a cast iron cistern fitted with valves to hold the water, and there is a pipe descending from that into the basin at the water-closet, and there is the basin itself.

2771. *Chairman.*] The invert-pipe?—Yes.

2772. Mr. *Cripps.*] Striking off the water-closet, which would be common to any system; independently of that, what would you be able to put in a cistern for; will you compare the same thing for a constant service and for an intermittent service?—It would not make any difference, there is no difference.

2773. *Chairman.*] Except that the cistern would have to be larger for an intermittent service?—It would require to be larger, but the intermittent system is not a very convenient mode of doing it; it is better always to have a supply of water at command.

2774. Mr. *Cripps.*] Supposing you had to supply water, so that the party should always have water at command, upon the constant system, to a house of that description, what would that cost, quite independently of the water-closets, altogether?—Only the cost of the pipe and the tap, that would be all.

2775. What would that be?—It depends upon the distance from the main. If the main is close at hand, I should think 10 *s.* or 15 *s.* would most likely do the whole job.

2776. Do you think that for an expense of 10 *s.* or 15 *s.* per house, in the case of a small house of that kind, you could give an independent supply, independently of the water-closet?—Yes; and for an outlay of from 2 *l.* to 50 *s.* you could give a water-closet along with it.

2777. *Chairman*] As a matter of fact have all the new houses, which have been erected since your constant supply was established, been fitted with these small cisterns and double valves?—No, a very few only; the plumbers do not like them, they never want any repair; that is a very substantial objection to a plumber.

2778. You mean that you have not power to insist upon those fittings, and, therefore the plumbers do exactly as they like?—Yes, very much. The proprietor of the house or the builder has the control of the matter, but he acts under the advice of a plumber.

2779. Would you propose as part of that rigid supervision you have spoken of, that those matters should be regulated by some authority?—I think you can have no better authority than the water company in the first instance, but to prevent the company acting oppressively in any way, there should be an appeal. In Scotland we have an appeal to the sheriff (who there is a law officer, as you are aware) in all cases of that kind.

2780. Mr. *Cripps.*] With your experience, what would you advise or recommend with reference to poor houses of this description as to cisterns; would you advise that there should be a cistern or not independently of the water-closet cistern, or that there should be no cistern apart from the water-closet?—If you have the water on the constant service system you are independent of a cistern except for the purpose of the water-closet.

2781. You would not recommend a cistern at all except for the water-closet?—No.

2782. *Chairman.*] Is this tap you propose to be over a sink, or is a sink under it to be prohibited?—There is an objection to having it over a sink, but I have never taken that objection myself, because I think it is a little unreasonable; if you put a tap in a window it is apt to be turned; a child may be tampering with it, and the water may run down and flood the people's house; I think it is better to take the risk of a little waste than do so much damage to the poor people.

2783. If they flood their houses when they let it run to waste, that is an effective check?—It does sometimes happen as matters are now, and you cannot always check it.

2784. Colonel *Hogg.*] Do you see any objection to cisterns to larger houses?—I see no objection to them; I think they are indispensable where you have baths and washhouses and kitchen boilers; you must have them then; but I think they are scarcely necessary except for the purposes of baths, and so on when there are a number of baths in a house, it is better to have a large quantity of water present, and have them filled quickly.

2785. *Chairman.*] Even when you have a constant service you must have a cistern in such cases?—Yes.

2786. Mr. *Cripps.*] If a pipe were strong enough to resist the intermittent pressure with the ordinary cock you have mentioned, it would be strong enough to resist the constant pressure with the cock you suggested as an alteration?—In Edinburgh we find it so.

2787. What is your pressure in Edinburgh?—It varies very much, from 450 feet down to four or five feet.

2788. We know that the houses in Edinburgh are of very different elevations?—Yes, the town is built upon a very varying and uneven surface.

2789. *Chairman.*] You have no regulating zones of supply; it is all supplied from one head, and under one pressure?—It is not all from one head, but the different sources from which the water comes, are made generally to work together.

2790. How do they work together if there are different heads of water; one would suppose the highest head would prevent the water running from the lower?—No, we are careful about that, because we know what the effect upon our pipes will be; we arrange it in every way as far as we can.

2791. Then you have certain zones of supply with reference to the different heads of water?—Yes.

2792. It is not apparent to me how, if there are two heads of water of different levels going into a series of pipes, one head can run without interfering with the other?—You do not have that; what I mean is we connect our street mains together as a common rule, hingeing the ends together, so that what is deficient in the pressure on the one may be made up by any excess of pressure on the other.

2793. Mr. *Cripps.*] With reference to your fire-cocks, how are those arranged?—The fire-cocks are placed upon the street mains at the cost of the police.

2794. About how far apart do you put them?—I dare say from 100 to 200 yards, but in some places they are much wider apart than in others; there is no very strict rule as to the distance, and the Water Company have no say in it; the whole is done under the instructions of the Town Council or Commissioners of Police.

2795. What kind of fire-cock do you use there?—The kind of cock in use up to recently, about two or two and a half years ago, I think was the common ground cock, on the same principle as this (*pointing to one of the samples produced*); a stupid apparatus, excessively costly, made of solid brass, and weighing from 60 to 70 lbs. each cock. And it very often happened when the water was required for a fire, that the plug could not be moved in it, and the water could not be got. But I recommended some two or three years ago to get the kind of tap which you now find in use in almost all the principal towns in England, Bateman & Moore's Patent, manufactured by Messrs. Guest & Chrimes.

2796. The same that was described to the Committee yesterday?—Yes.

2797. About what expense has that been?—It costs about one-fifth of the other; the other costs something like 5 *l.*

2798. Do you mean 1 *l.* 5 *s.*?—Yes, thereabouts; not quite so much as that, I dare say, altogether.

2799. *Chairman.*] Is this put on the main itself, or as a branch put from the main to the side of the street?—It depends upon the size of the main; but when the main is very large we do not put it on that main, we take a branch from it.

2800. To the side of the street?—Not to the side, we take it to any convenient place; but of late years I have got them to put the fire-cocks on the largest mains they can get.

2801. Mr. *Cripps.*] With the fire-cocks that are used now, is there generally a sufficient amount of pressure in the main for the purposes of a fire without any fire engine at all?—Fire engines have scarcely been used, to my knowledge, for the last two or three years. I do not know that they have been used once. We have had some serious fires in that time; but the pressure on the main has been sufficient, and the water has been forced on to the fire by pressure from the main; the hose has been screwed into the main.

2802. *Chairman.*]

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2802. *Chairman.*] You mean that they screw in the stand-pipe?—Yes, or attach the hose; you can do either.

2803. Mr. *Cripps.*] Has that been found satisfactory?—Yes, quite.

2804. With reference to the cisterns, do you allow a waste pipe from the cisterns and baths?—Yes; because we cannot help it, but those waste pipes are a source of enormous and incalculable waste of water, the cisterns are generally stuck in out-of the-way corners, where nobody can reach them, except a chimney sweep or plumber, or somebody like that; they are allowed to run there with their balls remaining downwards, for weeks and months continually.

2805. With reference to that, you say you ought to have more power of inspection?—We have power of inspection enough, but we have not authority enough to compel the necessary change, to make the constant supply system thoroughly effectual.

2806. *Chairman.*] Have you no power to cut off the cistern and make a direct delivery by tap?—No, we have not that power.

2807. Mr. *Benyon.*] You have not the power to remove waste pipes?—No.

2808. Mr. *Cripps.*] Those waste pipes remain as they were in many cases, when the intermittent system was applied?—Yes, they remain now as they were then.

Cross-examined by Mr. *Denison.*

2809. I understand you to say that you will not advocate having cisterns without a waste pipe for safety, in any case?—I know they have a waste pipe in other places, but I do not think it is a very good rule to go by; the proper way to have a waste pipe, is to bring the waste pipe into sight somewhere.

2810. I am asking you about having one at all?—I do not think you could do very well without a waste pipe.

2811. Either to a cistern or a tap?—I do not know about a tap; a waste pipe is connected with a cistern, and nothing else.

2812. These taps are over a sink, I understand you to say?—Occasionally.

2813. Generally, are they not?—Frequently.

2814. When they are in houses, we may say that they are almost always over some sort of sink, may we not?—Some houses have them without being over a sink.

2815. In what sort of rooms or places are those?—In a lobby sometimes.

2816. In a kitchen I suppose they are over a sink?—When there is a sink they generally contrive to put them there, and very wisely, I think.

2817. Now, about your company; do I not remember that at one time the Corporation had something to do with the supply of water to Edinburgh?—Yes, up to the year 1819 they had.

2818. Not since then?—Not since then.

2819. Then it was the company that changed the service from intermittent to constant, in 1852?—Yes.

2820. And they got the improved Act in 1863?—Yes.

2821. With more power?—Yes.

2822. You can tell me, I dare say, about the thickness of the pipes there; what was the general thickness of the service pipes in proportion to their diameter?—The weight of the pipes that I have had prescribed since the passing of the Act in 1863 was 6½ pounds the half-inch pipe per yard.

2823. That is just Mr. Bateman's figure?—And for three-quarter inch pipes 9 lbs.

2824. That is very nearly Mr. Bateman's figure; do you know what sort of service pipes there were generally before 1852?—No; I do not think there was any rule, and before 1852 I do not think the company interfered much with them.

2825. I want to know, as a matter of fact, what the pipes were?—I do not know.

2826. *Chairman.*] Do you not know what pipes the plumbers put in?—No; they generally put them in very light, but we had very few accidents.

2827. Mr. *Denison.*] The pipes at all times must have been sufficient to bear your very high pressure?—Yes, they must.

2828. I suppose the pressure is great enough to work the pipes as fire engines, in short without any machinery?—Yes, when the fire-cock is upon a small main we generally contrive to turn on an additional supply of water to it with greater force; they get more pressure by that means.

2829. And you have no pumping, as I understand you?—No.

2830. It is all gravitation?—It is all gravitation.

2831. *Chairman.*] Is that the case with reference to all parts of the town?—Yes, the whole of the town, and even the suburbs. Leith and Portobello are all supplied by way of gravitation.

2832. To that extent that you can throw water to the top of a house?—Yes; we have no steam-engine and no pumping power of any kind.

2833. What is the highest point of the town to which you can send water?—We deliver, I think, at a height of 450 feet.

2834. That is 450 feet above high-water mark?—Yes.

2835. What is your head of water?—We have one reservoir at a height of 760 feet, and another one at a height of 545 feet.

2836. Mr. *Denison.*] So that in fact if the Castle got on fire, you could still put it out?—If it did there would not be any difficulty about the water; there would be a great blow-up when it caught the gunpowder, no doubt.

2837. You gave my learned friend a figure for the cost of changing your supply. I think you a little understated it, did you not, because when it was nearer the time, you told Parliament that it cost 15,000 *l.* to make the change in one year?—No, I think not.

2838. £. 10,000 in one year and 15,000 *l.* altogether?—I am speaking from memory now. I am speaking from an indistinct recollection of what happened a good many years ago; you must not hold me to the precise figure.

2839. I do not find any fault with you; you will see what you said nearer to the date (*handing a volume of printed evidence to the Witness*). Look at Question 8219?—"It was more than 15,000 *l.* for doing so." That is more likely to be right than what I said just now.

2840. What was the population then?—I think the population then of Edinburgh, Leith, and Portobello, must have been something like 190,000.

2841. Just a question about these screw-taps. I did not understand an answer you gave to one Honourable Member of the Committee, who asked how you can secure these being turned off more than you can the other taps?—For turning the water on it is the same process.

2842. How do you make a person do it?—We have the same means precisely of making them as turning these off.

2843. You say it takes two or three turns to undo this, and let the water go?—It depends upon the quantity of water you want to let off.

2844. There are times when it wants two or three turns of this tap to let the water go fully through it?—It may.

2845. When that has been done, how do you secure the people turning it back again if they are so apt to leave the taps running?—They will turn it back naturally when they see the water continuing to run out.

2846. That is the nature of people in Scotland, is it?—Yes.

2847. *Chairman.*] They are thrifty people in Scotland?—Yes.

2848. Mr. *Denison.*] Do you not think that occasional carelessness of this kind may go towards accounting for the difference between the 35 gallons and the 18 gallons per day?—You must not confine it to that tap alone.

2849. I say has not that something to do with it?—Yes, it has a great deal to do with it, but you must not confine it to this alone; all the apparatus must be under inspection and regulation.

2850. The fact is that by that and by other means, there is, as nearly as possible, twice as much water used as ought to be used?—Yes.

2851. I understood you to say that the cisterns are almost universal?—I may say that they are quite universal.

2852. Supposing you have a constant supply without any cisterns, how do you manage in case a main wants repairing; the water, of course, has to be turned off?—That is a thing that occurs very rarely indeed; if a main is in a proper condition when it is laid, and is properly laid, you may say it never wants repairing.

2853. It is a very unusual human thing if it does not want repairing, is it not?—We have mains there nearly 50 years old, 47 years old, and I have had them taken up, and they were as good as when they were laid down.

2854. Supposing

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2854. Supposing you want to solder a new pipe into a main, you must turn the water off?—No.

2855. For a common extension, or service pipe, merely to put in a new pipe of any kind?—We do not require to turn it off.

2856. How do you manage, then?—We have an apparatus for the purpose. Upon the end of the ferrule is a cock; we put that in; first drill the main, and then when you are almost through the iron, apply the screw of the ferrule to it, and screw it in, and the cock is shut all the time you keep it shut; it is a recent invention, and a most capital thing it is.

2857. Whenever there are repairs wanted upon a district main all the houses upon that district main would be all the time deprived of water, would they not?—Yes, when the water is cut off, no doubt.

2858. You seem to be rather in favour of cisterns as we are; that is an additional reason for them, is it not;—I do not know how far you are in favour of them; I am not.

2859. Are you in favour of cisterns or not?—I am in favour of cisterns to a certain limited extent.

2860. If I was not very far wrong, I caught you saying that cisterns were indispensable?—Yes, where there are water-closets, baths, and kitchen boilers.

2861. That is to say, every house must have one or two cisterns?—Yes, where they have those appliances.

2862. In a small house, did you not say that the general draught of water is from the same cistern as supplies the water-closet?—Very often.

2863. It is generally so, is not it?—Yes, in small houses, which is a mistake.

2864. It is a fact?—Yes, it is a fact, but it is an error notwithstanding.

2865. You unfortunately have not got your Act here, which you ought to have had?—I did not know that you wanted it, or I should have had it.

2866. Can you get it for us?—Yes.

2867. Will you take care to do so, if you please?—Yes; if you send to Messrs. Loch & Maclaurin's you will get the whole set of Acts.

2868. You gave an answer with respect to intermittent supply, which rather astonished me; I understood you to say that the shock was less upon the constant system; it does not appear that the shock has anything to do with the constancy, but with the nature of the tap?—No; you misunderstood me; what I said was this, that if you apply this tap (*pointing to a tap*), you have no shock; no appreciable shock at least, but if you apply this one, the mere fact of shutting it, and giving it a half turn, produces a shock which you can hear almost all through the house.

2869. You did not mean to say that the constant system has anything to do with abating the use of the cock?—Yes, I did mean to say that; I meant to say that when you turn on the water, as you must do upon the intermittent system frequently, every time you turn, you must produce a violent shock in the pipes.

2870. The turning on is done by a man in the street; we are all accustomed to see it?—Yes.

2871. That is done by a screw machine, equivalent to that tap?—Yes.

2872. Therefore, there is no shock?—Yes, there is.

2873. Then you do not have the proper machine?—Yes, you do; these are opening from a large main, and these large mains supply small pipes; now, although the shock is nothing upon a large main, from opening it in that way, yet it makes a shock of very considerable violence indeed upon a small pipe.

2874. It seems to me that a man in the street takes several minutes to perform that operation?—They may take as much time as they like, but they do not necessarily take 20 seconds.

2875. We have all seen a man walking a good many times round a thing there, and walking slowly; that means a very slow turn off?—But that slow turn off from a large main is a quick turn on to a small pipe.

2876. You say that?—There is no doubt of that.

2877. As far as the service pipes go, your evidence is, that the thing wanted in a house is a screw tap, as against the crown tap?—Yes.

2878. That is the thing wanted?—Yes.

Cross-examined by Mr. *Johnson*.

2879. You told us the quantity to each person per head since the introduction of the constant supply; can you tell me what it was during the intermittent supply?—It was very low in some years, but we have been increasing the quantity from time to time for a great number of years past.

2880. You changed your system in 1852, as I understand?—Yes.

2881. Just immediately before that change can you tell me, under the intermittent supply, what was the supply per head?—I do not remember.

2882. Can you not tell me what it was at any period prior to 1852, when you began the constant service?—No, I have no materials here; perhaps I may have one paper here, if so, I will give it.

2883. You say now, as I understand you; I suppose that is uniform, or nearly so, that the supply amounts to some 35 gallons per head, per diem; now I want the same answer, adapting it to the period prior to 1852, before the introduction of the constant supply?—I have not got it.

2884. Cannot you give me any approximation?—I should give you one which would be very apt to mislead you and myself both. I had better not.

2885. You can tell me whether the supply since the constant service has been introduced has been considerably in excess of what it was under the intermittent service?—Necessarily it has, because under the former system they did not get enough; they had not water to give, and they did not get enough before that.

2886. Can you tell me this also, what is your source of supply at Edinburgh?—From the Pentland Hills.

2887. Is that entirely surface water, or springs, or what?—About 800 cubic feet per minute is what we are bringing in now; out of that there would be 470 or 480 of pure spring water that never saw the light.

2888. Is that from an elevation which will supply the water to every variation of level in Edinburgh itself?—Yes.

2889. Then, in fact, the whole system is by gravitation at various levels, but without any engine or artificial power, or means of raising the water to those levels?—Yes, that is so.

2890. Do you have several reservoirs at the different levels?—We have no less than eight reservoirs.

2891. At different levels?—Yes, they happen to be at different levels.

2892. On the hills?—Yes.

2893. Have you any distributing reservoirs in Edinburgh itself?—We have one only on the Castle Hill.

2894. At what elevation is that, for the lower levels or what?—It is 315 feet above the tide level.

2895. That is about half, because I think you told the Honourable Chairman that the maximum was about 700 and something?—Yes.

2896. But, as regards the principal reservoirs, the supply being entirely by gravitation, is from reservoirs made in the hills at some distance from the city of Edinburgh?—Yes.

2897. How far are they?—They are all at different distances.

2898. Will you give me the nearest?—You will find them all upon the map.

2899. The map will not be evidence; cannot you tell me how far the nearest is from Edinburgh; give me the nearest and the furthest?—The furthest one just now is almost exactly 14 miles from Edinburgh, but that is a compensation reservoir for the spring water, which is taken away from the drainage area.

2900. That has nothing to do with the supply?—Yes, that is a compensation reservoir, but the springs are all collected and carried past that in an aqueduct.

2901. To compensate parties who have been deprived of their natural resources?—To compensate the mill owners.

2902. Then the compensation reservoir is not at all available, or used for the supply of the city?—Not that one, but some of the others are.

2903. What is the furthest that is actually used for the supply of the city, and the nearest; give me about what they are in lineal distance?—The nearest would be about five miles, quite that, five and a half perhaps, and the most distant would be about nine miles.

2904. With regard to the expense, you said it was 10,000*l.* or 12,000*l.*, it seems

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seems to have been 15,000 *l.*; is that the expense which fell upon the company, or is that the total expense, including that which the owners of houses were put to as well?—It is exclusively the expense that fell upon the company. I do not know that the owners of houses were put to any expense.

2905. It was solely the company?—Solely the company.

2906. *Chairman.*] How was that expense incurred?—In enlarging the mains for the purpose of adapting them to the constant service.

Re-examined by Mr. *Cripps.*

2907. Was it for your purpose; was it a general improvement of your pipes for the new system?—It was more for the new system, but we required extensions besides. My impression is, however, though it is not very distinct, that that answer which was read from the book just now, must be nearly right, as to what it cost us to adapt our street piping to the system of constant service.

2908. You say that after 1852 you gave an increased supply?—Yes.

2909. Before that time the supply had not been enough in fact?—No.

2910. Was a part of that 15,000 *l.* expended in increasing your supply?—No.

2911. Mr. *Clerk.*] Will you be so good as to read the evidence you gave before?—There are two things which are quite separate from each other; the one applies to the street mains, and the other applies to the construction of reservoirs in the country, and bringing in the water to the town. The 15,000 *l.* applies to the street mains; the other was a much larger concern, no doubt.

2912. *Chairman.*] The 15,000 *l.* does not include any of the increased costs of the reservoirs?—No.

2913. Mr. *Cripps.*] The 15,000 *l.* was expended in and about the extension and improvement of your mains in the streets?—Yes.

2914. You say, that so far as the owners were concerned, there was no expense at all?—No.

2915. You told me before that they went on with the same fittings as had been adapted to the intermittent service?—Yes, we took the fittings as we found them, and went on with the supply of water in the best way we could.

2916. In fact you had no power to compel any alteration?—No.

2917. With reference to the water being cut off if repairs are required, my learned friend suggests to you that if the water was shut off and you had no cisterns, the parties would be without any water for the time?—If our street mains were shut off we should be without water.

2918. *Chairman.*] If the water were turned off at the main and there were no cisterns in the houses the people would be without water?—Yes.

2919. That seems the obvious conclusion?—Yes.

2920. Mr. *Cripps.*] The only difference would be, if there were cisterns, to leave them with what there might be at the time being in the cistern; that is all, is it not?—Yes, that is all.

2921. You say that the cisterns, in your opinion, are necessary on both systems, but would the cisterns for a constant supply system be necessarily as large as the cisterns for the intermittent system?—Nothing like it; in fact the necessity for turning off the water from our street mains is a thing that occurs so very rarely that the effect of it is quite inappreciable in the way of inconvenience.

2922. *Chairman.*] I think we understand perfectly clearly that, as far as the domestic supply is concerned, the water may be drawn direct by tap, without a cistern at all; but, as far as the water-closets are concerned, it ought to be drawn from a small cistern with a double valve?—Yes, and a large descending pipe, which is a most important condition of it.

2923. It has been stated before the Committee that there is a disposition amongst dishonest people to steal these brass taps; why are they made of brass?—I do not think there is any other metal you could make them of very efficiently; iron does not make a good tap, but we do not suffer from their being stolen in Edinburgh; it never occurs.

2924. We are dealing with what we are told exists elsewhere; what is the objection to the screw tap being made of iron?—It would not do.

2925. Why not?—You can never get iron to work well; it rusts.

2926. Supposing it is coated with zinc?—No coating I suspect would help you; you would never make a good iron tap.

2927. You believe it must be made of brass?—I think it must; I know I have seen iron cocks made for different purposes, but they are never good, and never satisfactory.

2928. We see in the streets spring taps?—Yes.

2929. What is the objection to those?—I do not like spring taps of any kind; the spring is a very imperfect sort of thing to work upon; a spring is not a very satisfactory thing; it is very apt to relax; you cannot trust it.

2930. No, we understand from you that the chief loss from waste in the Edinburgh supply is from the cisterns?—Yes, cisterns, water-closet apparatus, and bad valves, these are the three sources.

2931. You presume that the waste does not run out at the taps when they have them, but it runs off at the cisterns?—Yes.

2932. From the ball-cocks being out of order?—Yes, the ball-cock remains down, and the waste pipe of the cistern gets overflowed, and it runs for ever.

2933. The people have the practice, we understand, of tying up the water apparatus in the water-closets, so as to let the water continue to flow?—Yes.

2934. Those you think are the two main causes of waste?—Yes, I think they are; I think people are very ignorant of the effect of tying up the handles.

2935. As regards the consequence to the house you mean?—Yes, the house fills with bad air.

2936. The flushing, I suppose, is the thing that is required?—Yes, a very small quantity of water does it, and does it very effectually.

2937. If it is used to flush?—Yes.

2938. Mr. *Denison.*] You were describing these discs, I really could not hear whether you were recommending them or describing them as a measure of waste?—As a measure of waste.

2939. *Chairman.*] They have been used merely as gauges, to see how mud water passed through?—Yes.

2940. Mr. *Kekewich.*] With respect to your system of inspection, have you one inspector only?—No, we have about a dozen.

2941. How are they appointed?—By me.

2942. By the company?—Yes, through me.

2943. Who are the company; are they an independent company, or are they the authorities of the City?—It is a joint stock company of shareholders.

2944. The directors appoint the inspectors?—No, the directors appoint me, and I appoint the inspectors.

2945. How often do they inspect all the houses?—It is a very difficult thing to say how often they inspect them; each man goes over a certain portion every day, and makes a return of that to me, and that return is kept in a book; I know exactly what has been doing, and what the state of matters is.

2946. You do not depend upon any previous communication from the people to the effect that their apparatus is out of order?—Yes, we do; we take information from anybody we can get it from, and attend to it immediately in every instance.

2947. But you have a regular inspection; a weekly or a monthly inspection?—No, we go over it as we can. Each man has a certain district appointed to him, and he goes over it; it may take him some months.

2948. Do you find any objection on the part of the occupiers to allow the inspectors to come into their houses?—No, I have never known an instance of any respectable person taking an objection.

2949. Supposing you find the apparatus out of order, what do you do; do you proceed to put it in repair?—No.

2950. Have you means of summoning the occupier?—No, we have never summoned anybody; we have a printed form, and we fill up that printed form giving notice of the repairs which are required, and giving a certain time to have them done in, and we send back afterwards to ascertain whether it has been done. If the waste has been great, and no repairs have been effected, we turn off the water.

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2951. Have you not the power of summoning them before a magistrate?—No, not before a magistrate, but before the sheriff.

2952. Colonel *Hogg*.] Did you say that you find that the poorer people steal the fittings or not?—No, I never heard of a case of that kind; it may occur, but it must be very rare indeed in Edinburgh.

2953. Do the landlords fit up the poorer houses pretty well with cisterns and taps, and all that?—They fit them up, but not well; the apparatus is bad.

2954. Do they attend to your recommendations about it?—Some do, and some do not, but we are defeated very much by those horrid plumbers, who come always in the way. Their business is to make money out of the repairs. I should tell the Committee that it is a very poor trade when they contract for new work, and there is very little profit, but the profit when they get repairs to do is perfectly enormous.

2955. *Chairman*.] Could not three-fourths of that tap be made of iron, without any interference with its working?—Perhaps it might; I do not know.

2956. You have got a piece of it already of iron?—No, this is covered with tin.

2957. Mr. *Kekewich*.] How many appeals have you known made to the sheriff?—I have never known any; we have never summoned anybody before the sheriff for any defect in the apparatus.

2958. Then the people do not object to put their apparatus in repair?—Yes, they do; but we just do the best we can with them.

2959. You compromise it?—We do not care to compromise it, but we try to persuade them to do it, and if they were very refractory about it I would have the water turned off.

2960. Mr. *Benyon*.] How do you mean turn it off?—We have a cock in the street, and we should shut if off there.

2961. *Chairman*.] You have a cock on the communication pipe?—Yes.

2962. Mr. *Baillie*.] That would punish every man in the house, where they live in flats, as well as the offender, would it not?—In a flatted house in Edinburgh we should not do it in that way, we should try to cut off the water inside the house.

2963. You have the power of doing that, have you?—Yes, we have.

2964. Mr. *Benyon*.] When you were talking about the expense of connecting a new house with your system of water supply, you said that it would cost on an average from 10 *s.* to 15 *s.*, independently of the water-closets?—Yes, fully that; from 15 *s.* to 1 *l.*, I think.

2965. What did you include in that?—Only the pipe and the tap.

2966. Did you include the communication pipe from the main?—Yes, but I assume that the main is close at hand. I could not carry the pipe a long way off; if I did the pipe itself would come to that.

2967. What length of communication pipe did you include in that estimate of 15 *s.* to 1 *l.*?—A few feet only; not many feet.

2968. *Chairman*.] The communication pipe being under the curb, or just beyond the curb of the street, connecting with the main at that point?—Yes.

2969. Can you inform the Committee to what extent there are small houses in Edinburgh in your water supply district?—I am not quite sure that I can.

2970. Say houses of 20 *l.* and under, or any figure of that kind?—We go up to 10 *l.* I could send it up to you.

2971. If you give it in a general way now, you may correct the figures afterwards?—I think out of about 170,000 people who pay, out of a population which I assume to be 200,000, there are 23,000 of very small rents, that is, rents not exceeding 6 *l.*; and between 6 *l.* and 10 *l.*, I think there are 11,000 or 12,000 more, so that a fifth of the whole population is under 10 *l.* a year rent.

2972. Those are separate houses, not flats?—No; we have no separate houses in Edinburgh.

2973. That is what I am asking you; there are no small separate houses in Edinburgh; but they are rented in flats, and separately assessed in flats?—Yes, flats divided.

2974. Apartments?—Apartments; and each of those apartments in many cases is a separate house, occupied by a separate family.

2975. Separately assessed, and having a separate supply?—It should have;

they do not all do it in that way; it is a very common arrangement to carry a pipe up to a cistern in the roof.

2976. We may take it that water-closets are universal, then, in Edinburgh?—They are very nearly universal in all houses where they have a water supply.

2977. Either for several of those apartments on a floor, or separately for each apartment?—Very generally, except in low class houses.

2978. Mr. *Baillie.*] Is there one in each house, or one on each flat?—In some cases they have one for a floor, and in some cases for a tenement; but those are exceptional; the common case is when you have a good flatted house, that you have one for each flat; there are many houses of five stories high where you will find four families on each floor, each of those families having a water-closet, and in some cases each family having a bath as well.

2979. Mr. *Kekewich.*] Are they supplied by one cistern at the top of the house?—Yes; that is not universal; it is a very common case.

2980. More commonly, there are more cisterns than one; there is one cistern for each flat?—Yes, sometimes, but they have the supply sent in the first instance to the roof to fill a cistern of smaller or larger capacity, and then there are pipes bringing the water round, and branching off to the different floors, and supplying them in that way.

[The Witness withdrew.

Mr. *Henry Tomlinson*, sworn; Examined by Mr. *Wilkinson.*

2981. I BELIEVE you are the Manager of the Cambridge University and Town Waterworks?—Yes.

2982. Your supply there is under the constant system?—It is.

2983. And what is your average pressure?—About 120 feet.

2984. The supply has always been constant, I think, in that town?—That is so.

2985 Was it the fact that at first the consumption was very great indeed?—Yes.

2986. In what year was it?—In the first half of the year 1865, the gross consumption per head per day was 31 gallons.

2987. That includes the whole supply, trade as well as domestic?—Yes, it includes the whole supply, trade as well as domestic.

2988. You have given us the last half-year of 1865?—The first half of 1865.

2989. Does that represent about the ordinary consumption before you took measures which resulted in reducing that consumption; that would be a fair average of the previous consumption?—Yes, it would.

2990-1. You have given us 31 gallons as the gross consumption; what do you deduct for trade consumption?—The trade consumption amounted to 8·87 gallons per head per day, that would leave for the domestic consumption 22·13 gallons.

2992. You have given us the first half of 1865; did you take measures to inspect the defective fittings and to ensure a better provision of fittings in the town?—We did.

2993. Was that in the year 1865?—It began about that time; we found that if the consumption went on at the same rate at which it was going on then, we should have had to have increased our engine power and the capacity of our mains.

2994. Now, can you tell me the result in the consumption of 1866, after you had taken those measures which you have described?—The consumption in the first half of the year 1865, that is, the gross consumption, including trade and all purposes, was 19·1 gallons in 1865.

2995. 19·1 gallons as opposed to 31 gallons in 1865?—Yes.

2996. Deducting how much for trade consumption?—The trade consumption was less in the first half of the year 1866 than it was in the corresponding half of the year 1865; it was 7·83 gallons.

2997. 7·83 gallons contrasted with 8·87 gallons in 1865?—Yes.

2998. That left for domestic use 11·27 gallons?—Yes.

2999. But in stating that result as 11·27 gallons, you take the full capacity of the pumps, do you not?—Yes.

3000. Should you not make a deduction from that?—I think to ascertain the actual

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actual quantity of water consumed in the town, you ought to allow a certain percentage, perhaps 10 per cent., for leakages in the pumps.

3001. Would that 10 per cent. reduce the consumption for domestic purposes to 10·15 gallons?—It would.

3002. What do you mean by "domestic purposes?"—"Domestic purposes" includes the supplies to houses generally, for water-closets, baths, and so on, and all general trades.

3003. Such as grocers, drapers, druggists, and other general trades?—Yes.

3004. *Chairman.*] Those are what are called dry trades, are they not?—Yes.

3005. Mr. *Wilkinson.*] Do you include brewers?—No, not brewers; I might mention, in connection with the domestic supply, that in Cambridge we allow water to be used free of charge for gardens and lawns, and there are a great many houses in Cambridge which have gardens and lawns attached to them, that is included in domestic purposes; I may mention that there are several houses where there are a great many taps in the garden, and the water is supplied by the force of the pressure to a great distance; I know an instance where a gentleman has seven taps in his garden for watering lawns.

3006. That is included in the supply for domestic purposes?—Yes.

3007. You do not include breweries or large manufactories in "domestic purposes?"—No.

3008. There are no large manufactories in Cambridge?—No.

3009. There is a brewery there, I think?—Yes, there are several breweries, these we supply by meter, and that is included in the trade consumption.

3010. I understand you to state that this reduction in the consumption is due almost entirely to the repair of defective fittings?—It is.

3011. I see in your proof one instance that relates not only to the improvement, but to the cost, and, therefore, I will draw your attention to it; can you give me an instance with reference to the waste occasioned by the ball-cock of a water-closet cistern?—I can.

3012. Will you mention that instance to the Committee?—It was a water-closet cistern attached to a private house, and upon examination, the ball tap was found to be out of order, and wasting the water down the waste pipe, at the rate of about 10,000 gallons per day.

3013. Ten thousand gallons were running down the waste pipe?—Yes; I may mention that the waste pipe was improperly connected.

3014. Connected with what?—It was connected with the drain, so that the waste could not be perceived.

3015. As soon as that was discovered, you took steps to repair it, did you not?—Yes.

3016. Will you now tell us about the cost?—The only thing that was needed was, to change the ball-cock, to stop the waste.

3017. That would involve an alteration of the waste pipe?—No, it was only required to change the ball-cock; but as the waste pipe was improperly connected with the drain in that case, it was also necessary to alter the waste pipe, in accordance with the company's rule.

3018. What was the cost of those alterations?—The cost of changing the ball-cock and altering the waste pipe to the company, would be 6 *s.*

3019. That was the cost to the company?—Yes, that was the cost to the company; 10 *s.* was charged, showing a profit to the company of 4 *s.*

3020. There was an addition to the cost, because the waste pipe was not in a proper position, was not there?—There was.

3021. Supposing a new ball-cock only to have been needed to prevent the waste, what cost would that have involved?—It would have involved a cost of 4 *s.*; there would have been a charge of 8 *s.*, and a profit to the company of 4 *s.*

3022. Was it the case that, in going through these repairs, in many cases you found that the only alterations needed were the reparation of the ball-cocks?—Yes; to stop the waste water in many cases we had to alter the waste pipes.

3023. That cost how much?—In many cases the waste of water has been stopped by putting an india-rubber valve on to the ball-cock, at the cost of a shilling; in a great many cases the waste of water was stopped at the charge of a shilling.

3024. I suppose when you investigated these cases of waste, that would involve a good deal of visiting and inspection?—Yes, we went round to every house.

3025. Did you experience any difficulty, or was any dissatisfaction expressed on the part of the consumers of water?—Not the least.

3026. Were the necessary charges for the alterations and repairs paid easily, and without grumbling?—They were; there is not one owing now, they have all been paid.

3027. You say that change took place before 1866?—Yes.

3028. From that time to the present, have you had any further inspection?—No, and our consumption is now slightly less than it was.

3029. Although no further inspection has taken place, is it the fact that your consumption is less now than it was then?—It is. I had a return made up to last Friday week, and had all the meters taken to ascertain the consumption. I find that this half year it will be less than in the return I have given to you.

3030. From the observation you have made about the profit of the company, I assume that the company execute fitting work, do they not?—We do, but we leave it open to the town plumbers as well.

3031. You either execute the work for people, or you leave it to the town plumbers?—Yes.

3032. Are you in the habit of keeping in repair, without charge, any valves or washers of any cocks or taps you fix?—Yes, in the case of all the cocks that we put on, we keep in repair the washers or valves without charge.

3033. Have you found any cases in which repairs to either cocks or taps have been required since the time you have been in charge; I allude to those you put on yourself?—No, the cost to the company has been nothing.

3034. How long have you been manager?—Four years.

3035. During those four years, or since 1866?—We have been putting on the taps during the four years.

3036. Then that observation as to only a very few cases of repair having occurred, applies to the whole time of your management?—It does.

3037. What size of lead pipe do you use almost constantly at Cambridge?—We very seldom use pipe of more than half an inch in diameter.

3038. What weight of lead?—Five pounds to the yard.

3039. *Chairman.*] What head of water is it?—120 feet; I have a sample of the pipe here (*producing the same*); the small size is the one generally used; there are other sizes in case they are required.

3040. Mr. *Wilkinson.*] Do you find that the company make the provision of the fittings a source of profit to them?—They do; we make a gross profit of about 35 per cent. upon the total amount of the fitting accounts.

3041. What is the opinion of your company with regard to the use of cisterns for domestic supply?—We have only one or two cases in Cambridge where cisterns are used for domestic supply; that is where there have been new houses built, and where the architect has been a London architect.

3042. Do you, or do you not, advise them or require them?—We do not advise them, but we do not prohibit them; the public may do as they like, but, as a fact, they are not used in Cambridge for domestic supply, with one or two exceptions.

3043. And the company does not require their use?—No; and we actually discountenance them for domestic purposes.

3044. Why do you discountenance them?—The water drawn fresh from the mains is superior and better for domestic uses than it possibly can be from a cistern; a cistern becomes contaminated with the foul air and any other impurity; that applies particularly to cisterns connected with water-closets; I have examined cisterns connected with water-closets, and have found great impurities in them; the water from them would be filthy.

3045. Can you state to the Committee an instance in which you think that the introduction of a cistern has been done unadvisedly, and to the prejudice of the parties?—I can.

3046. Will you state it?—Very recently a new building for the London and County Banking Company has been erected in Cambridge, and the architect was a London architect. We were putting down pipes of very large diameter, of an inch and a quarter diameter, and we were about to supply the water for domestic purposes through a cistern, and not by tap, upon a communication pipe to the main. I wrote to the clerk of the works, strongly advising him that the taps for the domestic supply should be put upon the communication pipe leading to the cistern, and that the cisterns that were about to be used for the domestic supply were unnecessary; that the pipes which were being put in were much larger and more expensive than there was any necessity for.

3047. *Chairman.*] What did he do?—One or two of the cisterns were done away with, but as they had everything ready, and the contract was taken, it was carried out according to the specification, with the exception that two cisterns were done away with, and they have now three cisterns. I made an estimate of the cost of supply and laying the pipes as they had laid them, and of the cost as the company would have laid them, and I found that the cost, as the work was executed, was three times the cost according to our system.

3048. *Chairman.*] And what has happened since, do you know at all?—No, nothing.

3049. Mr. *Wilkinson.*] You cite that as an instance of the cost being three times greater, occasioned by the introduction of the cisterns, than it would have been if they had adopted your advice, and had the drawing or supply cocks from the main?—Yes; I may mention in connection with that, that the value of the old pipes as old material would be sufficient to pay the cost of laying in a new supply according to our system.

3050. You have mentioned to the Committee your custom with regard to the use of cisterns generally; how about cisterns for water-closets, do you require those?—Yes, in all cases.

3051. And do you require the waste preventers that we have heard of?—We recommend them, we do not require them; the great majority of our cisterns are water-closet cisterns with the ordinary apparatus.

3052. *Chairman.*] Have the others been used in Cambridge?—Yes, and they have worked very well in small houses principally.

3053. Mr. *Wilkinson.*] Are there waste-pipes to the cisterns?—You cannot have a cistern without a waste-pipe; it overflows; if it is up-stairs, and there is no waste-pipe, it is liable to do a great deal of damage. We insist that the overflow, instead of being carried into a drain, should be turned into some position where an escape of water would be noticed.

3054. It should be put in a proper position to render investigation and examination easy?—Yes.

3055. *Chairman.*] To make it apparent?—Yes, to make it apparent; that is the principal object; I may mention that in the case I have referred to, in which a large quantity of water was being wasted, we took it just through a wall close to the cistern; and if the ball-tap now leaks, it will leak over a little doorway going into the yard and so will be easily perceived, and they will be sure to inform the company at once.

3056. Mr. *Wilkinson.*] That was the leakage of 10,000 gallons a day which you referred to?—Yes.

3057. Do you allow stop-cocks?—Not in all cases; if there is a possibility of the supply being extended to any other purposes than those it was laid on for, because in that case they might either ignorantly or intentionally use the supply for other purposes than they had agreed to be supplied for; for that reason we prohibit them without special permission.

3058. Mr. *Denison.*] Will you explain what "stop-cock" means?—This is a stop-cock (*producing one*), and that is placed generally just inside the house on the communication pipe from the main. If those were placed in another place, the water might be used for another purpose. We will take the case of a house attached to a brewery; we might supply the water for domestic purposes, and not for the brewery; and the brewer might, by extending this pipe, use the water for the purposes of the brewery, or any other purpose than that of domestic supply; we do not allow them to do that without permission.

3059. Mr. *Wilkinson.*] You mean stop-cocks under the control of the consumer?—Yes.

3060. The company must have stop-cocks under their own control?—Yes.

3061. *Chairman.*] On the mains?—Yes.

3062. Mr. *Wilkinson.*] But you are speaking of a stop-cock on the communication pipe under the control of the consumer?—Yes; it is only in special cases that we permit them.

3063. Is it the fact that they are rarely used, except in the larger houses, colleges, and so on?—They are not often used in small houses.

3064. The trade of course you supply by meters, do you not?—Yes.

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3065. I think I understand you with regard to waste pipes, that they should be in such a position as to be apparent at once?—Yes.

3066. So that any improper leakage may be discovered?—Yes.

3067. *Chairman.*] That is the outflow?—Yes.

3068. Mr. *Wilkinson.*] In attaching the services, do you use the full bore ferrules, or the small ball ferrules?—We use the full bore ferrules, that is just half an inch in diameter; that supplies a pipe of just half an inch in diameter; there is no restriction in that respect whatever; I believe when the company was first established they did use a few small bore ferrules.

3069. That is the full bore ferrule that you have produced, is it not?—Yes.

3070. But you have discontinued the small bore ferrule, and now use the full bore ferrule?—It was discontinued before I went to Cambridge; at the commencement they used them, but they found that they did not answer.

3071. With regard to the cases where you supply by meter, is there any difficulty at all in the circulation of the quantity of water that is consumed?—No.

3072. There is no objection made on that point?—No.

3073. Do you find it necessary to place any restriction upon the number or position of the taps used for domestic purposes?—None at all; it is simply a matter for the convenience of the consumers, and the expense they like to go to; there is no restriction whatever.

3074. With regard to any variation in the height of supply required, do you alter your charge in any way?—No, we can supply the water to the top of the highest house in the town, and the charge is the same.

3075. Do you require separate service pipes for each house?—No, there is no restriction whatever in that respect; they please themselves about it; if they were having a small pipe laid down to supply a large number of houses, of course we should recommend them to have a larger pipe; but there is no restriction about it.

3076. With reference to the profit you said the company made, you said that it was 35 per cent. when they supplied the fittings?—Yes.

3077. Do you find that sufficient to pay for all collections, inspection, turncocks' work, and main and service repairs?—Yes, it more than pays.

3078. In fact, all the town working expenses are more than covered by the profits you make upon the fittings?—Yes, all those town expenses.

3079. Can you give the Committee a little information with reference to the mode in which you deal with the prevention of fires; have you fire-cocks fixed upon the main pipes?—We have.

3080. At what interval?—Every 100 yards.

3081. And, I suppose, those fire cocks you use also for watering the streets, do you not?—We have done so up to the present time; we are just now altering the arrangements, and supplying through meters.

3082. In what way are you going to alter the arrangement?—We are altering the arrangement for watering the streets only, not for fires.

3083. Mr. *Kekewich.*] Do you mean yards of three feet?—Yes, three feet yards.

3084. Mr. *Wilkinson.*] Engines are not required, are they?—They have not been used in Cambridge for a number of years; they are not required there.

3085. Do you find the existing pressure sufficient in any part of the town?—Yes, the pressure has always been used in case of fire, and it has been found sufficent without the use of engines.

3086. Is that without using any means to concentrate the pressure at any point?—It is.

3087. You do not close any of the main cocks?—We have never done so.

3088. *Chairman.*] Cambridge is quite flat?—It is; I may mention that I know as a matter of fact, that the inhabitants of Cambridge have a strong feeling of the benefit of the company's constant pressure in case of fire, and it is a remarkable fact that, owing to the constant supply given by the company, never since their supply has been established in Cambridge has there been a fire of any extent, and before that time fires of considerable magnitude occurred.

3089. Do you mean that there has never been a fire consequent upon the water being there, or that the water being there has put the fire out?—The water being there has put the fire out, so that it has never got to any extent.

3090. Mr. *Denison.*] The fires have been frightened, evidently?—They have not gone to any extent.

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3091. Mr. *Wilkinson.*] You mean by that to any extent or amount of conflagration?—Yes, I do.

3092. What fire cock have you in use at Cambridge now?—It is a sluice cock with a bend in a couple of boxes; it is an expensive fire cock.

3093. Is it one you yourself put up?—No, it was in use at the beginning of the works; and though I should have recommended a different kind, still it would not be well to have two kinds of fire cocks in one town.

3094. You must have one general alteration throughout?—Yes.

3095. If you were supplying for the first time you would not use the sort of fire cock which is now adopted?—No.

3096. Would you use a cheaper one?—The present cocks cost about 4 *l.* each, but a ball hydrant would cost, including fixing, from 30 *s.* to 35 *s.*; that includes everything, opening the street paving, making the connection, and so on.

3097. Is that the one which Mr. Bateman described?—Yes, it is the one Mr. Bateman described yesterday; I include everything, except the contractor's profit; that would be the cost.

3098. And your estimate of cost agrees with that which was given by Mr. Bateman?—It does.

3099. I see, with regard to frost, you consider that one of the advantages of the constant system has reference to its greater facility of preventing the inconveniences of frost; I will not go particularly into that with you, except to ask if you can give the Committee any specific experience obtained during the last winter?—I can.

3100. Will you do so?—In large houses where the supply pipes go up-stairs to the water-closet cisterns, at the entrance of the communication pipe into the house, we place a stop-cock; generally this enters into the underground or basement kitchen, and the tap which they use for ordinary purposes in the kitchen is lower than the whole of the communication pipes up-stairs; in the winter time I have recommended that this stop tap as it enters the house should be closed; and at night when the ordinary requirements for water have ceased, the draw-off tap should be opened, so allowing all the water in the communication pipes in the house to be drained; that prevents their freezing; in some cases where they had no stop-taps, I recommended that the supply should be kept on at a very small stream, just sufficient to keep up a constant stream, and I have found during this last winter that that has had the effect of greatly decreasing the number of burst pipes; it has increased the consumption to some extent during that time, but nothing in comparison with the advantage given in respect of the saving of the pipes.

3101. It was done only at the cost of a slightly increased consumption?—Yes; during the time that the frost continued, our consumption increased about 10 per cent.

3102. You have told us what has been done at Cambridge, where you have had actual experience; have you at all directed your attention to the possibility of introducing a scheme somewhat similar in principle to yours in London?—I have.

3103. Do you think that it would be attended with great advantage, or the contrary?—I have not the least doubt that it would be a very great advantage, especially in the poorer houses.

3104. First of all, with respect to the companies?—To the companies it must be a great advantage.

3105. In what respect?—Because I believe that the supply of water to London now might be very greatly reduced by the introduction of a constant service under proper arrangements.

3106. Do I understand you that the waste would be reduced by a constant service?—It would, and that would give a great and corresponding reduction in the working expenses of the companies in respect of pumping. I may mention in connection with that, that in Cambridge, at the time the great waste was going on, if the system had not been altered and attended to, the company would have had to have gone to an increased outlay to provide additional engines and mains for the purpose of continuing the supply; it would be the case in London; it would prevent their having to go to some extent to increased expense in providing an additional quantity of water. If the quantity of water was reduced

reduced

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reduced to the point, I think it might be, it would reduce the working expenses.

3107. *Chairman.*] If proper precautions were not taken, the supply would be so much increased that you would have to lay down new apparatus?—Just so. I meant that the companies in London would have to go to increased expense in providing an additional quantity of water.

3108. Mr. *Wilkinson.*] What you mean is, that without the same supervision which has been exercised at Cambridge, to provide London with a constant supply, would entail a great additional expense upon the companies?—If the supply of London keeps on increasing as it is now doing, an intermittent supply would cost more than a constant supply if it was introduced under good regulations.

3109. *Chairman.*] You mean that if there were a constant service, which would reduce the supply to the proper minimum, that would prevent the companies having to go to a further expense in providing an additional supply?—Yes, that is our experience in Cambridge, and we may apply it by inference to London.

3110. Mr. *Wilkinson.*] Should you consider cisterns necessary?—I should not consider them necessary; I should leave them to the option of the consumer; my own opinion is, that you ought not to have a cistern for domestic supply; I think the supply is very much better when taken fresh from the mains, but I should not prohibit them. I would leave it to the consumers to please themselves.

3111. I understand you to say that you would not prohibit cisterns?—No.

3112. You would allow those in use to be discontinued?—Yes.

3113. With regard to the water-closets, you would have a small cistern there?—Yes, decidedly.

3114. With regard to inspection, do you think that after the new system was fairly introduced, any much greater amount of inspection that is now required under the intermittent system would be necessary?—I think if the inspection did not take place till after the constant service was introduced, no doubt at first, as the inhabitants would be unaccustomed to the use of the fittings by constant supply, and as the things in some houses would not be in proper order, the consumption for some time might be slightly increased; but after the first inspection, if it were a thorough one, I do not think that much would be required.

3115. After the new system was fairly introduced, and a thorough inspection had been made, do you think the necessity for inspection would be much greater than it is now under the intermittent system?—I do not think it would be.

3116. With regard to the stealing of fittings, do you think that any additional expense would be incurred in that respect?—You might have amongst the poorer classes of houses an iron stand with an iron pipe with brass working parts, which it would not be worth their while to steal.

3117. In the constant supply, the pipe would be always charged, and therefore, to a certain extent, there would be the protection of the water in the pipe?—Yes.

3118. *Chairman.*] Supposing there was a disposition to steal, to what extent could you dispense with brass or lead fittings, such as would be likely to be stolen?—You might have all the piping above ground, and likely to be taken away, of iron; and an iron stand and brass parts might be so small that it would not be worth their while to steal them.

3119. Would they be more or less expensive than lead and brass together, having regard to the conveniences or inconveniences of working into a house?—The difficulty of laying iron pipes is greater than that of laying lead pipes, but the cost of iron is cheaper, and the cost of the tap is cheaper; altogether it would, perhaps, come to about the same.

3120. Mr. *Wilkinson.*] It would be only necessary to have the tap of brass, and the rest might be of iron?—I should only have the working part of brass, and the value of that would be very small.

3121. At any rate, as far as the consumer is concerned, the moment the tap is stolen, his supply would be stopped or interfered with?—Yes; and then again, in the smaller houses the consumer has no direct interest in keeping on the tap under the present system, because he can get a supply just as well with or without it; but if the constant system were introduced he would have a direct interest in seeing that it was there.

3122. *Chairman.*] If he cut the tap off he would still have the lead pipe flowing

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flowing freely ?—Yes; but if anything of that kind occurred the water would be cut off.

3123. When you found it out?—Yes.

3124. Mr. *Wilkinson.*] Can you give the Committee any information as to the cost of introducing the new system?—It would be simply a question of seeing that the fittings were in proper order.

3125. Would it cost any more to introduce the constant supply system, than it would to introduce the intermittent system in new houses?—In new houses the cost would be much less, as I have already said.

3126. I wanted to get from you, if I could, the details of the cost of introducing the water into a house; it was suggested to me that you might be able to give that; if so, I think it would be convenient to have it, the cost of the fittings actually put into a new house?—In the case of a large new house in Cambridge, the cost of introducing the water fittings, including the ball-cocks to the cisterns, because, as a rule, all houses to which we lay on water have not been supplied with ball-cocks, would be, say with three water-closets, I should think, 7 *l.* or 8 *l.*

3127. You are taking the case of a large house with three water-closets; can you give the same information with regard to a smaller house of 10 *l.* a year, or not exceeding 10 *l.* a year?—The cost would be, perhaps, 10 *s.* or 15 *s.*, but sometimes a tap supplies a number of houses; I have known instances where the cost has been only about 1 *s.* 6 *d.* per house.

Cross-examined by Mr. *Denison.*

3128. What does that 10 *s.* or 15 *s.* include?—It includes the whole of the communication pipe and a tap.

3129. Any cistern?—No, there would be no cistern to small houses.

3130. About what length of communication pipe do you assume in that?—About 20 feet.

3131. Now, how many houses do you supply at Cambridge?—Now we supply between 3,700 and 3,800; about 3,800.

3132. That means premises of all descriptions, I suppose?—Yes.

3133. Including trade premises as well as domestic?—Yes; in ascertaining the quantity of water per head, the trade consumption is deducted.

3134. I wanted to get the number of houses; what population do you supply?—We reckon five inhabitants to each house.

3135. That is nearly 18,000, is not it?—Yes.

3136. What is the population of Cambridge town, and the University; you take the first half of the year, I see?—In the district we supply about 30,000.

3137. The district you supply, you say?—We supply a little out of the town of Cambridge proper.

3138. Then you supply a little more than half what we may call the town?—Yes.

3139. How do the rest get their water?—Cambridge is very well supplied naturally with water.

3140. I thought that I remembered it was; how is it supplied?—By pumps; the water can be got within a few feet of the surface by boring, and there is Hobson's stream running down two streets of the town, and a few inhabitants get their water from that; all the houses in Cambridge are well supplied with water; the company's water is taken for convenience in many cases; a gentleman who uses pump water for his water-closets and so on, finds sometimes that there is not water in his cistern, because it has not been pumped up; he has the company's water, because then he is sure of having water at all times.

3141. Where are the waterworks; where do you get the water from?—From a spring three miles from Cambridge.

3142. That is at Coleton?—At Cherry Hinton.

3143. You say you require people to have their waste pipes to their cisterns, so that the waste itself is visible?—We do.

3144. You have power in your Act of Parliament I suppose, to do that?—We have power to see that they have proper fittings, and that is one of our conditions.

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3145. Have you the power of making that a condition before you supply it?—Yes.

3146. Do you happen to have your Act of Parliament here?—No; it is not by our own Act that we have the power; it is by the General Waterworks Acts of 1847 and 1863.

3147. You have an Act of your own, have you not?—Yes, but there is nothing in it referring to fittings.

3148. Can you let me have it in the course of the day?—I can.

3149. You said something about ferrules, and you exhibited a ferrule; just let me look at it; what was the object of your showing this?—Simply to show that there was no restriction in the size of the ferrule, and that the character of the ferrule was the same as the size of the pipe.

3150. You call this altogether the ferrule?—Yes.

3151. The tap goes on here, does it?—The communication pipe leading into the house goes on there; the other part is screwed into the main (*explaining it*).

3152. You have to send notices sometimes to people about these waste pipes of theirs, have you not?—That was at the time they were found out during the inspection.

3153. How often do you inspect?—We have only inspected once.

3154. That is once since you began?—Yes.

3155. But you recommend inspecting once a year, do you not, or rather you stated, as a fact, that you do inspect once a year; have you not published that statement?—I think not; we went round to all the supplies during the twelvemonth.

3156. Some people might call that an inspection?—Yes, but I mean that the inspection I have been speaking about was done during twelve months, though we were not constantly at it.

3157. Have you not published a statement that you do inspect, or go round every service (if you like that better) during every twelve months?—Will you refer me to the page of the pamphlet you are looking at?

3158. I have got a little thing here at page 24; there is something like it; this is a thing you published against Mr. Quick?—Yes.

3159. Did you not say that "Those cases which do not come to the office are dealt with by the company's officials, keeping their eyes and ears open when on duty, and discovering all they possibly can in the shape of leakage, or customers who should be supplied by meter; besides which, the foreman goes systematically to the water-closets and larger consumers (when his other work permits), and sees them about once in 12 months;" did you not publish this?—As you have read it, I have published it.

3160. You rather mean you published it as I read it, I presume?—Yes, quite so; at that time we were making the inspection, and I thought it might be necessary to do it once in 12 months; but finding that the consumption has decreased since the inspection was made, I have not carried out my intention.

3161. Very little more than a year has gone by since then?—I have no intention at present of carrying it on every year.

3162. You sent this circular, I see: "I am requested by the directors of this company to inform you that your water-closet cistern has a waste pipe attached to it, contrary to the regulations of the company; the directors having found that a great quantity of water is being regularly wasted through overflow pipes attached to water-closet cisterns, and that in the way they are at present fixed the leakage cannot be perceived, they have decided that if waste pipes are to be allowed they must be carried to some position where the escape of water will be noticed." When were these things issued?—During the inspection.

3163. At what date, because I have got 1866 written upon mine; not printed, but written; was it not so?—Not in 1866. There might have been one or two cases that had not been attended to, in which it was sent in 1866, but the majority had been in 1865.

3164. There were some in 1866, evidently?—I do not recollect any.

3165. You will not say there were not?—I will not say there were not, but I do not recollect.

3166. You make 35 per cent. profit upon the fittings, I understand?—Yes.

3167. How do you reconcile that with that statement to your customers, that you

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you are prepared to make those alterations at cost price?—I think you will find, if you refer to the case I gave, that the cost of making the alteration in the waste pipe was 2 *s.* and the charge was 2 *s.*

3168. Does that mean plumbers' cost price. You invite the people to go to you instead of to the plumbers, by telling them that you will make the alterations at cost price; do you make those alterations at cost price or not?—We do.

3169. Then you do not get 35 per cent. profit upon them?—The company get no profit upon them.

3170. What did you charge for those alterations?—Two shillings in that case, and that I should say would be about the average.

3171. What is the reason why you do that so much more liberally than the other things?—There is one reason, that perhaps it is attributable to the negligence of the previous management of the company, that they did not make the alteration when the supply was laid on.

3172. Do you not think that is a guess; it sounds very much like one to me?—It was my proposal.

3173. It was your proposal that you should do what?—Make the alterations to waste pipes at cost price.

3174. Then why did you charge this 4 *s.* of profits, as I understood, in this case?—That was not upon the waste pipe; you will find that the alteration of the waste pipe was charged 2 *s.*

3175. Did you not tell us some time ago that you charged a gentleman 10 *s.* for altering his waste pipe, the 10,000 gallon gentleman, and that it cost you 6 *s.*—I did.

3176. Now, will you explain that?—Repairs of fittings we do not execute at cost price; this charging cost price only refers to the alteration of the waste pipe.

3177. This was an alteration of the waste pipe?—The cost altogether was 6 *s.*, and the charge altogether 10 *s.*, showing a profit of 4 *s.*; if there had been no alteration of the waste pipe required, the cost would have been 4 *s.*, and the charge 8 *s.*, and the profit 4 *s.*; that shows that there was no profit made upon the alteration of the waste pipe.

3178. You put them altogether and say that there was a profit of 4 *s.* upon the whole concern?—I simply state what the profit was.

3179. Then instead of making 35 per cent., you get 50 per cent. profit in some cases?—In some cases we do, but I may state that the actual profit upon fixing ball-cocks varies; sometimes it is a great deal of trouble, and sometimes it is not, and we have a charge to cover it.

3180. It is a profit of 100 per cent.?—In that case it is.

3181. You charge 100 per cent. profit when you think you can; you said that people were charged no profit at all in some cases, but on the whole, you made an average of 35 per cent.?—Yes, that is as I have stated.

3182. Let us understand what the 35 per cent. is; is it 35 per cent. in addition or 35 per cent. out of the gross charge?—Thirty-five.

3183. Do you add 35 per cent. to what it costs you, or do you mean in round numbers, that one-third of the whole charge is profit?—I stated that the gross profit to the company was 35 per cent. upon the whole amount of the fittings.

3184. That is to say, if you get, say 100 *l.* for doing this job, 35 *l.* of that is profit?—Yes, that is the gross profit, so to speak, of the working capital; I do not allow any interest upon the working capital.

3185. The answer is, that if you receive 100 *l.* for this plumbing job, 35 *l.* of that 100 *l.* is profit, is that it?—That is it.

3186. That is to say, that the job has cost you 65 *l.*?—Yes.

3187. So that that gives a profit of 35 *l.* upon 65 *l.*, that is the real thing is it not, upon the gross of those jobs; you received 100 *l.* upon a lot of plumbing jobs?—Yes.

3188. And of that 100 *l.*, 35 *l.* is profit?—Yes.

3189. £. 65 is the cost?—Yes.

3190. Therefore, the profit is a profit of 35 *l.* upon a job of work costing 65 *l.*?—Yes, it is.

3191. Now about iron pipes, have you any iron pipes in use?—Comparatively few.

3192. Very few, I suppose?—Very few indeed.

3193. They are not things that you would recommend?—I should not for service in general, the water lying in them.

3194. Of course they rust, unless the iron is different in Cambridge from what it is in London?—They would not rust if they were painted outside.

3195. But they would rust inside; wrought-iron pipes especially rust inside, do not they?—Not unless the air is brought constantly in contact with the wet pipes.

3196. There is always air in contact with the water; is not that so?—The rusting under the intermittent system, is greater than under the constant system.

3197. I ask about wrought-iron pipes; do not you know as a fact that wrought-iron pipes do rust very soon?—Not very soon.

3198. How soon, according to your experience?—There have been a good many put down in Cambridge, but I have not known any of them rust very soon.

3199. How long have you been there?—I have been there four years.

3200. Iron taps, I understand, you do not recommend?—Not altogether iron in some cases; in the cases I mentioned I thought it would be advisable to have iron taps with brass working cocks.

3201. Do you mean the brass working in the iron?—The part where the wear and tear would be, ought to be of brass.

3202. Are there any such things in use?—I know that they are made.

3203. Are there any such things in use?—I have not any personal knowledge of them myself.

Re-examined by Mr. *Wilkinson.*

3204. With regard to the rusting of the iron pipes, were you present when the evidence was given, that with hard water the pipes do not rust; that a coating is deposited when the water is hard, which does not allow of them rusting?—I do not remember hearing that evidence.

3205. Is it within your knowledge that hard water does deposit a coating which prevents the rusting of the iron pipes, and that soft water does not rust the pipes?—The number of iron pipes laid down for hard water is so small, in my experience, that I cannot speak to that.

3206. However, your experience is, that they do not rust; you have not heard of any rust in iron pipes, where your experienced has tested it?—I have heard nothing about it; I am not familiar with it.

3207. With regard to the profit, which my learned friend put to you as to charging for plumbing, it is quite clear that your profit was upon the ball-cocks solely, and not upon the waste pipes?—Yes.

3208. Of course there would be an inducement to you to take care that the ball-taps were in proper order, and to take care that the waste pipes were in proper order especially, over any other, so that there might be no more waste than could be avoided?—Yes.

3209. That would be an inducement to you to execute that particular work in a proper manner, without a view to profit?—Yes.

3210. Have you had any complaints made to you of the gross charge which you have made in comparison with the charges made by other tradesmen?—No; we work as cheaply as any plumbers in the town, and cheaper than some, but not much; we take care not to increase our charges.

3211. You have told us that the profit you have is to cover the working expenses?—It more than covers the working expenses.

3212. In your judgment is there any reason why the London companies should not do the same?—I do not see why they should not make a profit.

3213. My learned friend, Mr. Denison, quoted something which seems to be a reply by you to another thing; he asked you about inspection, whether you did not inspect once in 12 months. I find a statement that the foreman goes systematically to the water-closets and so on, and sees them once in 12 months. Is that the only statement that my learned friend referred to?—That is so.

3214. It is not a system of constant and general inspection, but only as far as the water-closets and certain consumers are concerned, about once in 12 months?—Yes.

3215. Have you had any complaints about that inspection?—None at all.

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3216. I observe that the date of this reply of yours is November 1865; that would be about the time that the fittings were undergoing the alterations which you described to the Committee, would it not?—It would be approaching the end of the time.

3217. I think you told my learned friend that you had no special power at all under your Act referring to fittings?—None at all.

3218. Nothing at all. You proceed under the general clauses of the General Waterworks Act?—Yes.

3219. *Chairman.*] What is the system of supply to the 10 *l.* houses in Cambridge?—Simply the tap.

3220. Are there no water-closets?—In some cases there are water-closets.

3221. How are they provided for?—In the small houses at Cambridge, we recommend them to have a waste-preventing-system like this (*exhibiting a diagram*).

3222. Are the colleges supplied by you?—They are.

3223. Do you supply them by meter or by special contract?—By special contract.

3224. Have you any means of telling us the consumption per head in any of the colleges?—No, I have not; the arrangement for the small cottages, and for some of the water-closets is shown here (*exhibiting a diagram*); a double valve.

3225. How big is the double valve; what is its capacity?—About 15 inches in length, and one foot wide.

3226. Has this the further advantage, that it requires no extra strengthening of the structure to put it into the water-closets; can you put this in without strengthening the structure?—Yes, it is not very weighty, and we fix them complete, including the communication pipe, for 30 *s.*, these waste-preventing arrangements.

3227. Is the flush from those practically ample for the purpose of keeping the water-closets clean?—Yes, it is from about two to three gallons each time; you cannot take any more than that.

3228. Mr. *Baillie.*] How long have you had a constant supply at Cambridge from the pipes?—From the first; 14 years ago, when the works were established.

3229. Before that, how was Cambridge supplied with water?—From surface wells and bored wells; and we got a little water in some parts from surface water.

3230. Have you always had a constant supply there?—We have.

3231. Colonel *Hogg.*] You have said that very few houses in Cambridge had cisterns?—Yes, for domestic supply.

3232. But large houses that have boilers and baths cannot be supplied without cisterns?—There are cisterns in those houses.

3233. You say that the water coming from the pipe is much purer than that from a cistern; I want to know is the water, as a general rule, as pure from a cistern as from the main pipe, or not?—In the one case you are certain to get pure water, and in the other arrangement you are not; if the cisterns are not attended to, the water would not be so good as if direct from the main. There is risk in the one case and not in the other.

3234. Have you sufficient powers for inspection?—We have found it so; it might be different in London.

[The Witness withdrew.

Captain *E. M. Shaw* sworn; Examined by Mr. *Cripps.*

Captain *E. M. Shaw.*

3235. You are, I believe, the Chief Officer of the Metropolitan Fire Brigade?—I am.

3236. And you have recently made a report upon the water supply of London as regards fires; it was made on the 17th of July 1866, was not it?—It was.

3237. That report has been partly read here, and the whole of it has been treated as if it were proved; that is your report, is it; first of all the one of 1866?—Yes, 25th June 1866.

3238. I see at the end of that report there is a part that I read to this effect: "For these and other reasons, I hold a very strong opinion that no advantage at all, commensurate with the expense, would be likely to arise from any attempt that

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that could be made to improve the present fire-plugs, which are, perhaps, the worst to be found in any city in the world; and I would urge on the Board the advisability of using their influence to obtain as soon as possible, a complete system of constant supply throughout the metropolis, coupled with some such ready means of applying the hydraulic pressure to the suppression of fires, as that above suggested"?—Yes, that was made on the 17th of July 1866.

3239. Then you go on to say, "Any modification of the existing intermittent system must be attended with loss and inconvenience, and prove unsatisfactory in the end." Is that your opinion now. From your experience of fires in the metropolis, do you think that there should be a constant pressure system?—That is my opinion.

3240. Do you think it would be unwise and useless to attempt to improve the present fire-plugs by adapting them to the intermittent system, and that nothing would be satisfactory but having a new system of constant supply?—I am quite sure that the present fire-plugs must be condemned before a constant pressure can be brought into London.

3241. There is another report of yours, made on the 25th of June 1866, a short one, contained also in that book?—There is.

3242. I will read from it this passage: "The course which I should recommend for obviating this inconvenience would be, to discontinue the existing intermittent service which is complicated and imperfect, and requires special men to work it, and to substitute for it a constant service, with a sufficient number of hydrants which could be opened by anyone, and would immediately deliver water without the delay of proceeding to a distance to open one sluice-cock, and shut a number of others, in order that the whole of the available supply might flow to the required locality. I am convinced that the establishment of a constant high-pressure service will be found the only mode of overcoming the difficulties, and that any attempt to improve the present arrangements will only tend to prolong the existence of a system which, so far as fires are concerned, is most imperfect and unsatisfactory." That is the opinion, is it, that you have formed?—It is.

3243. *Chairman.*] You had better clear up this a little and amplify it, because there are so many things mixed up in it; there is first a constant service; then what is the necessity for a sufficient number of hydrants; will you explain that; I want you to explain all these proposals which are mixed up in this; you think a constant service is desirable?—I think constant service is desirable for fires.

3244. Mr. *Cripps.*] I want to know whether the other recommendations which you also suggest are dependent upon that first, because principal, improvement, namely, having a constant service?—I think that so long as the service is intermittent in the side streets, it would be hardly worth while to go in those streets to the expense of putting up hydrants.

3245. *Chairman.*] Will you explain what is the necessity for putting up the hydrants at all, if by hydrants we are to understand a stand pipe at the side of the streets; is that the hydrant that you have referred to?—That is a hydrant that I should recommend; there are many classes of hydrants.

3246. Will you explain; do we understand that you mean by this hydrant a stand pipe at the side of the street?—Yes, that is the hydrant I should recommend.

3247. What is the absolute necessity for that?—In order that there should be the means available for unskilled persons to obtain access to the water on occasions of emergency.

3248. Do you mean that it is desirable that the Metropolitan Board should employ people for the purpose of putting out fires, who have not even the skill to obtain water from the street plug?—That is one way of putting it, but that is not exactly the way in which I should put it.

3249. What is the amount of skill required to get water from a cock?—At the present moment, according to my view of the question, nobody can obtain water in the side streets of London unless he is acquainted with the special service of that company in that particular part of London.

3250. That is a totally different question; that is a knowledge of all the different cocks that are necessary to be turned on for the purpose of getting a supply from the main pipe into the side pipe, is not it?—Precisely.

3251. That, of course, requires rather an extensive knowledge of the water system in the immediate locality?—Yes.

3252. But

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3252. But if you have a constant supply, that knowledge is not necessary?—Just so; then we come to the question of the hydrants.

3253. You mean that in a constant supply every plug, the moment it is taken up, will supply water; is that so?—It will supply water.

3254. What is the amount of scientific or skilful knowledge that is required for the purpose of screwing off the head of a fire-plug, and then turning the cock?—None whatever; but then the drawback comes that there is no command whatever over that cock.

3255. But if there is a constant supply, as much water as you can ever get will come out of it, will not it?—Perhaps as much will come out of it; but it should be under sufficient command.

3256. Would it not be precisely the same thing with the hydrant; if you took off the cap of the hydrant the water would come out of it, would not it?—No, because the hydrant involves special command of the cock or valve for the hydrant itself.

3257. You want a hydrant with a regulating valve in it?—That is what I understand a hydrant to be. It is not usual to call that which leads the water up to the level of the street a hydrant, unless it is fitted with some means of commanding the water. It is usually called a goose-neck if there is no command cock or valve.

3258. Then you would not be satisfied with a hydrant merely, but you want a cap to unscrew, so as to get the water free?—It would not be possible to use it in that way; for this reason, that in order to use it at all the hose must be screwed on, but as soon as the cap is taken off the water would run out, and no one could screw the hose on.

3259. Had that been ascertained to be the fact?—It is absolutely the fact; you cannot screw on a hose to a pipe when the water is under pressure.

3260. Then the only effect of having a constant supply, without a regulating hydrant, would be that there would be so much pressure on, that you could not screw the hose on?—You could not screw the hose on at all, unless there was a special command cock or some means of shutting off the water from the hydrant.

3261. A gentleman from Edinburgh, Mr. Ramsay, distinctly stated that he did screw the hydrant on; if I recollect right, he said that it was not necessary to take the branch to the side of the street, but if it was a very large main sometimes he made a small branch to take it off from the large main?—A stand-pipe does not necessarily involve a pipe in the side street, it may be in the main street.

Mr. *Cripps.*] You are aware, Sir, of the evidence given yesterday by Mr. Bateman upon the matter.

Chairman.] He told us what the apparatus, and so forth, would be; to have a hydrant with a regulating valve; that involved carrying it to the side of the street in a branch pipe, is not that so?

Mr. *Bateman.*] No, it is not; the manner in which the water is withdrawn from the fire-cock is by the introduction of a portable stand-pipe; and after the cover is taken off, the hydrant, which may be anywhere, on the footway or in the street, is introduced into the cavity, and then the two are screwed together and then the hose is attached to the end of the stand-pipe before the little handle is moved which opens the valve; those are used all over the country. This is a drawing which has just been put into my hand; this is a cross section of the valve itself, which I recommend (*exhibiting the same*); that stand pipe is placed within a foot or 18 inches of the surface of the street, and is covered by a box represented there; and when it is desired to use it, the lid of that box is taken off, and this is introduced and attached to the top of that pipe; and when the hose is attached there, that handle is turned round so as to depress the ball and allow the water to pass; it is convenient sometimes to take it to the side of the street, but that is not necessary.

3262. Mr. *Cripps* (to the *Witness*).] Do you know what Mr. Bateman has been suggesting?—I know Mr. Bateman's hydrant very well indeed.

3263. *Chairman.*] What I understood you to be describing was the proposal, that wherever there was what is called a fire-plug, there should be a branch pipe to the pavement, and a permanent hydrant, with a regulating valve, there erected?—Yes, I think so.

3264-5. That is what you wish?—Yes.

3266. Mr. *Cripps.*] Do you think it would be inexpedient to attempt to improve the present fire-plugs, retaining the intermittent system?—I am quite sure it would; the present fire plugs are very bad indeed.

3267. The Committee have had the whole of the report before them; after speaking of what has been done in other places, I see you say at page 14, "Every attempt made to mark the exact situation of fire-plugs or hydrants, has proved more or less unsatisfactory, inasmuch as they have been in almost all cases placed below the ground level, and the marks have therefore been necessarily at some distance; the best and simplest mode yet adopted has been the ordinary mark on a wall directly opposite, indicating the exact distance in feet and inches from the base of the wall to the opening in the pavement. The true marks should be the hydrant or fire-plug itself, which instead of being sunk below the level of the ground, should be elevated considerably above the pavement or footway as before mentioned, so that one man could without difficulty screw on a hose and get to work at a fire in a moment, without being obliged to wait, as at present, to insert a stand-pipe and make all the necessary connections. These water posts might be conveniently used as lamp posts, or might be placed within the present lamp posts, so as not to occupy any extra space?"—Yes, that is so.

> *Chairman* (to Mr. *Cripps*).] I suppose we are to understand that you are now proposing this as the best plan, and if the Committee do not approve of it, that we are to revert to the old system?
>
> Mr. *Cripps.*] I can only propose what the witness approves of, and has reported upon.
>
> *Chairman.*] There is an inconvenience in calling one witness to give evidence, which seems to be rather the reverse of what another has said.
>
> Mr. *Cripps.*] That is almost unavoidable where things are so much a matter of opinion.

3268. To the *Witness.*] You have reported upon that, and your opinion is such as I have read just now?—My opinion is briefly that there should be over every plug or means of access to the water, a proper hydrant, with a standcock to it; and if it were entirely left to me, I should propose to have a fixed stand-pipe in the streets; but I should rather have anything than the present piece of wood, which is merely stuck into the socket of the pipe, and is the most barbarous contrivance I have ever heard of.

3269. What you propose, you consider would be a most complete improvement?—Yes, I am sure it would be.

3270. If there is to be an alternative for the present system, of course there might be a great many intermediate systems between this and the present, which is very bad?—The present system is very bad, and I think a great many other intermediate systems might be suggested besides that which is suggested.

3271. Short of what you suggest?—Yes, short of what I suggest, and yet a very great improvement upon the present system.

3272. Do you know that your report was communicated to the Water Companies?—I have heard so.

Cross-examined by Mr. *Denison.*

3273. My learned friend will return to that charge. I must ask you how you know that these reports of yours which you made, the whole of this printed thing, was sent to the Water Companies?—I heard it at the Board.

3274. Mr. *Cripps.*] In this pamphlet there are extracts from the replies of the Water Companies; here is the Southwark and Vauxhall Company: "I am instructed to state that the court of directors of this company will have great pleasure

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pleasure in co-operating with the Metropolitan Board of Works with a view of remedying the evils complained of; but they regret that they do not think it possible to carry out the plan suggested by the chief officer of the fire brigade." That refers to the report of Captain Shaw, showing that that report had been before the parties who sent this reply?—Yes, that is so.

3275. Mr. *Denison.*] Will you look at your pamphlet at page 20?—Yes.

3276. You see, I think, in parenthesis at the end, "the above report," and so on?—Yes.

3277. Will you be good enough to say where the "above report" begins; it begins at page 19, the very page before, does not it?—I cannot say. I had nothing to do with the printing of these reports. I sent in my reports as I was desired to do, but I know nothing of what was done with them in the way of printing.

3278. You told us just now that you understood, or heard, that part of your report, which my learned friend has been using here, was sent to the Water Companies; I ask you distinctly, did anybody at the Board of Works tell you that more than this one page of the report was ever sent to the Water Companies?—My impression is that I have heard that the whole of those reports were sent to them, but I cannot say more than that.

3279. I ask you whether anybody at the Board told you so?—I think so.

3280. I should like to know who that gentleman was?—I cannot say.

> *Chairman.*] It is stated there on page 21, "Extracts from replies by the Water Companies to the preceding reports by Captain Shaw, dated 25th of June 1866."

> Mr. *Cripps.*] That is exactly what I have said; that it was the second report that was communicated.

3281. Mr. *Denison* (to the *Witness*).] You say that the present things are very bad, simply pieces of wood; whose fault are the pieces of wood?—I cannot say; I am not a lawyer, and I do not profess to judge.

3282. You do not mean to say that it is the fault of the Water Companies, I presume?—I say nothing about it; I do not know.

3283. I do not know how much the head of the fire brigade in London knows till I try; do you know that your fire brigade had an Act passed in 1865, and in fact were constituted by it?—I do.

3284. Do you know that in that Act the Metropolitan Board are made the authorities for everything?—Clearly.

3285. Do you know that they have these powers: "All the powers being exercised by any local body or officer within the metropolis as respects fire-plugs, shall henceforth be exercised by the Board; and the Board shall be entitled to receive copies or extracts of all plans kept by any Water Company under the provision of the Act of the Session of the 15th and 16th years of Her Majesty," that is 1852; "and every such Water Company shall provide at the expense of such Board in any mains or pipes within the metropolis, plugs for the supply of water in case of fire, at such places of such dimensions, and in such form as the Board may require; and the fire brigade shall be at liberty to make such use thereof as they may deem necessary for the purpose of extinguishing any fire; and every such company shall deposit keys of all their fire-plugs at such places as may be appointed by the Board; and the Board may put up on any house or building a public notice in some conspicuous place in each street in which a fire-plug is situated;" are you aware of that?—Quite so.

3286. And being aware of that, what is to prevent the Metropolitan Board from requiring a fresh kind of fire-plug to be established?—I do not think that the Metropolitan Board have had time to consider such a question; they have only had charge of this matter for about a year; but this has no connection with the last question which I was asked I may be allowed to say; I was asked who is responsible for the present fire-plugs; the present fire-plugs were laid down many years ago.

3287. Do you know whether any application was ever made to the Water Companies to allow any fire-plugs to be used?—I am not aware that there has been any yet.

3288. Are you aware that under the Act of 1847, which applies to all the companies,

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companies, they are bound to keep all the pipes full, as a provision in case of fire?—I should be very glad to find that that was the case.

3289. The clause is, "The undertakers, at the request of the Town Commissioners, shall fix proper fire-plugs in the main, and other pipes belonging to them, at such convenient distances, not being more than the prescribed distance; or if no distance be prescribed, not more than 100 yards from each other, and at such places as may be most proper and convenient for the supply of water for extinguishing any fire which may break out within the limits of the special Act; and in case of any difference of opinion as to the proper position, or number of such fire-plugs, it shall be settled by such inspector." Then there are two more clauses. The undertakers are to repair the fire-plugs, and deposit the keys thereof at the engine-houses, and that the cost of all these things is to be defrayed by the Town Commissioners; of course here in London it is the London authorities, inasmuch as the companies are also bound to keep the mains charged with water; do you say that they do not keep them charged?—I have not said anything upon the subject at all.

3290. Then, I will ask you, do they or not keep them charged?—In the first place I do not believe that they are bound to keep them charged at all times under pressure.

3291. Do they, in point of fact, keep the mains full?—Full of water perhaps, but not under pressure.

3292. Not under pressure?—Certainly not in all cases.

3293. How do they vary the pressure?—By shutting off the cock.

3294. That can be turned on by the turncock?—Certainly.

3295. Then the complaint that has been made by you, or by the Board, has been, that the turncocks are not always ready; is not that so; have you made that complaint or not?—Yes, sometimes.

3296. We have had a little evidence about that from Mr. Quick, if I recollect right. What amount of delay do you allege against any of the companies, in not having their turncocks ready?—I do not quite understand the nature of the question. Do you mean what time?

3297. Yes, what time?—They vary from five minutes to three hours.

3298. From five minutes to three hours?—Yes, I think three hours is the longest time; in some cases there has been no attendance at all.

3299. At what place?—I cannot say off-hand. I did not expect to be asked these questions here.

3300. Just answer me this: Have not the fire companies suggested that a messenger should be kept at each fire station, whose duty it should be to call the turncock?—That has been often suggested.

3301. Has that been ever done?—Never.

3302. Then you have almost answered what I have to put next: This duty has been entirely ignored by the fire brigade?—I rather object to the way in which the question is put. The duty is certainly ignored by the fire brigade, inasmuch as it is no part of their business, and they have always declined for many years past to undertake any responsibility in the matter whatever.

3303. Then that being so, it is a matter of accident whether any particular person comes first to give notice to the turncock?—It all depends upon the arrangements the Water Companies make in the matter.

3304–5. You have made none?—I have made none.

3306. The turncock lives somewhere?—I presume so.

3307. Does the fire brigade know where he lives?—In some cases, I may say always; but the reason for this is obvious. The turncocks are very much more numerous than the fire brigade stations have ever been, or are now, and, consequently, they have very much more facilities for obtaining quick information than getting it through us.

3308. Do the fire brigade ever go to the turncocks or not?—Never.

3309. What then would be the advantage of a constant water supply, supposing the turncock is always ready?—Supposing the turncock is always ready, it will simply be that he will have a better command of the water with the hydrant.

3310. If he turns it on, it is put on with the pressure directly?—Yes.

3311. How much better off would you be with fires, if the turncock is always ready, by having a constant supply?—I do not quite understand the nature of the question. We shall be far better off in this way; that at present, when the turncock turns on the water, it has got to fill every cistern on every level throughout

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throughout the whole service before the maximum quantity is delivered at the point where we require it.

3312. Before the maximum quantity is delivered?—Yes.

3313. You do not mean to say that the water does not flow out of the fire-plugs as soon as it is turned on?—Certainly not. It does flow out when the water is turned on, but not in the full quantity until after every cistern throughout the service is completely filled; so that the ball-cock in each case is taken up to the point of shutting off the supply.

3314. Do you mean that the supply of water to the fire engines is actually deficient?—I have not asked the question yet.

3315. Then I will ask it. Is the supply of water to the fire engines insufficient?—In many cases decidedly so.

3316. Has it become so since 1862?—No, I think it must always have been so.

3317. Were you not examined by a Committee in 1862?—I was.

3318. And were you not asked, "In what parts of London is it, according to your experience, most deficient," and did you not say, "Generally speaking it is efficient all over London for any purposes for which we can ever require it"?—Yes.

3319. Is that right now?—It is as right now as it was then; but in great emergencies it is very difficult indeed to get enough within an available distance.

3320. *Chairman.*] That is at the commencement?—That is at the commencement.

3321. When the cisterns all round are charged, you usually get a full supply of water?—We usually get an abundant supply then.

3322. Mr. *Denison.*] At Question 578, I find you are asked this, "Since you have been in London have you experienced any want of water?" Do you remember how often you said you had?—"Twice, I think, in about 600 fires." The next question is, "Then have 600 fires occurred since you have had charge of the brigade?—I think almost exactly 600, as well as I know; I have not counted them up. The exact number I have since ascertained to be 678." "Have many of these been of magnitude?—Several of them." Now, one question about these hydrants, or whatever they are called, do you prefer Mr. Bateman's plan, or another?—I prefer Mr. Bateman's plan very much to anything that exists in London at present.

3323. That is not my question; do you prefer Mr. Bateman's plan or this one, of which there is a picture in your pamphlet?—I prefer the one of which there is a picture in my pamphlet.

3324. What is the difference, if any, in the cost?—I cannot say. Mr. Bateman's I should say would be very much cheaper than mine. But there is an obvious reason for that. Mine is adapted to all circumstances, whereas Mr. Bateman's is adapted for a high-pressure service alone.

3325. For London you prefer your own?—Of the two, certainly.

3326. Can you give in the cost of this?—I do not think I could give the exact cost, but I should suppose about 7 *l.*

3327. *Chairman.*] Have you made any inquiries of any person as to what he would undertake for the Metropolitan Board to find and lay down this apparatus for?—No, I have not gone so far as that. But I have consulted with persons acquainted with such matters, and I have reason to believe that they would be in large quantities about 7 *l.* each.

3328. That would not include the cost of opening the streets, would it?—Yes, it would, and putting them in.

3329. Mr. *Denison.*] You mean that for 7 *l.* each. The Metropolitan Board, under the powers of that Act which I read to you, may have these things whenever they like?—I think so.

Re-examined by Mr. *Cripps.*

3330. It was with reference to that power, and that duty of the Metropolitan Board, that you were asked to report, and in addition to your report upon their plan, to make any suggestions that occurred to you?—Yes.

3331. And then it was in answer to that that you made the suggestion that a constant supply was the first necessity, before making any other alterations?—Yes.

3332. And that is your opinion still?—Yes.

3333. Now at fires, is it of very great importance to have a full flow of water at the commencement?—As soon as possible.

3334. If there were a constant supply, you would get that much sooner than you would if, as with the intermittent supply, the cisterns had to be first filled?—Certainly.

3335. Your attention has been called to some evidence you gave on a former occasion, and I observe that you say, in one or two spots there was a deficiency of water, and a very serious one?—Yes.

3336. It was this second report of yours, was not it, as far as you know, which was communicated to the Water Companies; the report in which you say that the establishment of a constant high-pressure system would be found to be the only mode of overcoming the difficulties?—I presume so.

3337. Mr. *Kekewich.*] Have you ever known of any great delay taking place, in fixing the hose to a main in case of fire?—No; there can never be very great delay in fixing the hose on, but there is very great doubt in London as to the advantage of fixing it on when we get to a fire.

3338. Do you think that you would get water more speedily by the system which you propose?—Yes.

3339. It is of the greatest consequence in case of fire, that an abundant supply of water should be given at once, and with certainty?—Undoubtedly, that an abundant supply should be given at once.

3340. Colonel *Hogg.*] It is the fact, is it not, as the learned counsel suggested to you, that in case of fire the usual plan is to send one messenger for the engine, and the other messenger for the turncock?—I believe so; the police attend to that.

3341. When you arrive with your engines, you expect to find the turncock there, and the water turned on ready for your use?—We do.

3342. The hydrants you recommend would be of no use without a constant supply of water?—They would be so far useful that they would be much more available than the present fire-plugs with any supply of water; but in my report to the Board, I merely told them that I thought it would be a waste of money to adapt anything to the present system of pipes, which are adapted simply to a low pressure service.

3343. Do you think that fires would be more speedily extinguished if your hydrants were established than by the present system?—I think there is no question about it.

3344. In that case there would be a great saving in fire insurance?—Yes.

3345. Can you tell me what pressure you think there ought to be?—I think about 300 feet.

3346. Is that the maximum?—That is the maximum I should ask for.

3347. Is that absolutely necessary, do you think?—Not absolutely necessary if the pipes were laid down entirely anew, and sufficiently large; but as the quantity of water that comes out of any given pipe depends upon the pressure under which that pipe is, it is of great importance that so long as there are small streets, and small pipes running through them, and large warehouses in those small streets, that there should be such a head as is equal to delivering a sufficient quantity of water out of those small pipes to meet any exigencies that may arise. That is my reason for putting the figure so very high as 300 feet.

3348. You put it higher than other people?—I put it higher in order to meet that contingency which I believe is found in every large mercantile town in the world, where valuable warehouses are built in close proximity to the dwellings of the poorest people, where there are very small water pipes for the ordinary house supply, but where there is a great need of a large supply at certain times.

3349. Mr. *Benyon.*] If you had a hydrant in one of those narrow streets, would you be able to approach it in the event of a fire occurring in one of those large establishments, to which you allude?—We could approach some hydrants.

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3350. Not the hydrants in the narrow streets?—Not a hydrant that was put immediately under the house, though even that might be possible, because it is quite possible that with a hydrant in the street, hose reels might be used to a large extent.

3351. The use of the turncock being sent for is to turn the water on?—To turn the water on into the service by the sluice cocks; not to work the plug.

3352. Have not keys been offered to you by the Water Companies for the purpose of doing that for yourselves?—Yes, and accepted.

3353. And do you use them?—We endeavour to do so.

3354. Then the turncocks are not wanted?—Yes, they are as much wanted as ever they were.

3355. If you have the keys, and can turn the water on, what is the use of the turncocks?—If we had the keys, and could exactly know where to go, and the sluice cock to turn the water on, then we should be independent of the turncock; but it is almost impossible for any one, except a skilled turncock, with his daily orders from his own company, to know where to go to turn the water on and off. In point of fact it is skilled labour which the turncocks do; and if the Metropolitan Board ever take over the duty on behalf of the fire brigade, and take it away from the Water Companies altogether, they will have to employ an enormous staff of skilled persons to do the skilled duty, which, as far as we know at present, devolves entirely upon the Water Companies; it is a very large question of expense.

3356. Lord *F. Cavendish.*] I think you said in your evidence in 1862, that there had been only two cases out of 600, in which the supply of water was deficient?—Yes.

3357. Does your subsequent experience enable you to state that that is about the proportion?—There would be a larger proportion since that time.

3358. Can you state what proportion?—I cannot say off-hand.

3359. Can you approximately?—Ten per cent. perhaps.

3360. Ten per cent. of cases in which the water supply has been deficient?—It is a very rough guess, but I think about 10 per cent.

3361. *Chairman.*] Provided there is a constant supply at every fire-plug, you would then have merely to deal with the fire-plug in case of fire?—That is the great point.

3362. Therefore that would obviate all the inconveniences which arise from a want of knowledge of the water system of the neighbourhood?—Yes; in fact it reduces the labour from skilled to unskilled.

3363. Then in that case, as the caps of the fire-plugs are all of one size, your people could easily unscrew them and draw the plugs?—At present they are not screwed down at all.

3364. Is there not a screw cap over every plug?—Not over every plug.

3365. Do you mean to say that the plugs are only stuck in?—They are only stuck into the hole.

3366. Are they not stuck into the hole with a screw cap over them?—Where there is a very large opening there is a sort of cover, but in a general way there is no cover at all.

3367. If there is no cover at all, your people can draw the plug out without difficulty?—Certainly; they can do so now.

3368. It is no use now, because there is no water unless it is on the main?—It is no use in long services, unless we know where to find the sluice cocks, so as to open some and shut the others.

3369. That difficulty would be got over by a constant supply?—Certainly.

3370. You say there is a difficulty for the want of regulating apparatus; you cannot screw the hose on to the plug at the place where the plug is?—Precisely; there is no screw on it; it is merely a socket in the pipe.

3371. Do we understand that you cannot put the stand-pipe into it now?—We cannot put the stand-pipe into it unless the pressure is relieved so that we can put in the stand-pipe, and afterwards turn on the pressure again.

3372. Therefore you consider it necessary that above the fire-plug there should be a regulating apparatus to enable you to connect the stand pipe with the hose on the same spot?—In fact, to convert the common street plugs into some sort of hydrants.

3373. So that you can keep down the water until you have screwed on the hose or stand-pipe, as the case may be?—Precisely.

3374. We understand that the next difficulty is, that when the water is turned into the district mains it runs away through a great number of orifices into all the houses supplied by that district main, until they are all charged with water?—Yes.

3375. Therefore, at the commencement you would not get any head or pressure of water if you did connect the hose with the plug at present?—Precisely so; wherever the service is intermittent that is the case.

3376. Do you know from experience how long it takes after turning the water on at the sluice cock before you get anything like a head of water at the fire-plug?—There is no regular time for that; it altogether depends upon the length of the service and the number of houses to be supplied, and also the hour at which we turn it on: thus, for instance, with a very short and small service, say not supplying more than 50 houses on a low level, if the water supply has been turned off from those houses only one hour, in all probability we should get an abundant supply almost from the beginning, in two or three minutes; on the contrary, with a very large service, say a mile or two long, and supplying a large number of warehouses, and the water supply turned off, we will say for six, eight, or perhaps 12 hours, we should be a long time indeed before we should get a full and complete supply out of the pipes.

3377. Before you get a-head of water?—Yes, before we get the quantity of pressure due to their size, and the head under which they are.

3378. Have you in London made any experiments as to the pressure of water being sufficient to throw the water direct from the mains?—Frequently; where the services are full the pressure is very fair.

3379. But have you found that you could throw water from the hose, provided the pipes are full, without the intervention of an engine?—In a great many cases. After the first hour of the fire, as a general rule, we always put in stand pipes and use them.

3380. You stated that you would like to have a head of 300 feet pressure; is that the result of any actual experiments as to the height or head of water that is necessary to throw a jet to any given height?—It is not so much throwing a jet to any given height, as to the necessity for getting a sufficient quantity from a small sized pipe.

3381. Do you consider, generally speaking, that the head of water in the London service is sufficient to throw the water to the required height, but is insufficient as regards the quantity of water discharged?—I hardly go so far as that. I think the head of water is generally sufficient in London. I think the head of water might be made, with proper hydrants, a good deal more available than it is at present; but I hardly think it is sufficient for all purposes.

3382. Your main object in having a higher head of water is to increase the quantity by increasing the velocity with which it can go through the pipes?—Precisely; but in point of fact a tendency has arisen in London of building enormous and valuable warehouses in close proximity to very small houses, which require a very little water indeed.

3383. Have you made any inquiries to ascertain what the effect upon the pipes would be of raising the head of water from the present height to 300 feet?—I cannot say that I have made any inquiries. I am aware that it would be a very great change; an enormous change.

3384. Have you made any inquiries to ascertain whether the pipes that have been laid down would bear so great a pressure upon them?—Yes, general inquiries, and I believe the pipes are not capable of bearing it.

3385. Then it would be a question of taking up all the pipes in London for somebody who chooses to build a warehouse in an inconvenient situation?—Precisely so; something of that sort.

3386. Do not you think it would be better to leave the persons to the consequences of their folly, rather than put people to the expense of pulling up and relaying all the pipes in London?—On the contrary, I believe that London is of so great importance that there is no reason why it should be second to any other town in the kingdom; we know that of recent years other towns have supplied themselves with high service constant supplies; of course I speak merely from my own point of view, but there is no reason why London should not do as well as other towns.

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3387. Do you think that everything should be made subservient to the possibility of a fire happening in a warehouse which somebody has chosen to build in a most inconvenient place?—My view is simply that I think London should be first in all these things.

3388. You do not think that expense is a consideration?—I have not taken the expense into consideration at all; it is not my duty.

3389. You simply take it from a fire point of view, regardless of expense?—Yes, precisely.

3390. Mr. *Cripps.*] As Mr. Bateman is not here, but his hydrant is, will you explain it to the Committee?—This is Mr. Bateman's plan (*producing a hydrant*).

3391. Mr. *Benyon.*] Is that your hydrant?—No, this is a cheaper one than mine.

3392. *Chairman.*] This is a portable hydrant, to be screwed on in the street, is not it?—Yes; this is Mr. Bateman's plan.

3393. That is the piece that would be put on the fire-plugs as they remain in the street, in the ordinary way?—Yes; the flange of the pipe in the street comes up, and this flange is attached to it in the usual way; inside this there is an enlarged piece of pipe, and inside that enlarged piece of pipe is a ball; in this case, usually made of gutta percha; that ball is kept constantly forced up against this, by the pressure of the water underneath.

3394. You screw the cap off, and then you put the hydrant in, and then you screw it on?—Yes; there is a cap in addition to cover it, to prevent the dirt of the street coming in, and you take the cap off; then to get access to the water, you screw in this piece of pipe. On the lower part of this there is a screw which catches that ball and forces it down; you screw round that spindle; that forces the ball down, and lets the water pass up through this opening (*explaining the same*).

3395. After you have screwed it on you let the water come out?—The water comes out here; and if you want to let it out both sides you can do so.

3396. If that is used, your expensive process of 7 *l.* for every hydrant is wholly unnecessary?—I do not go so far as all that; I think that my plan is a great deal the better plan, for this reason, that mine acts upon both systems, whereas Mr. Bateman's is only fitted for a constant supply system; it is a very beautiful and cheap hydrant, this.

[The Witness withdrew.

Mr. *Wilkinson* stated, with reference to the information which the Committee desired from the Metropolitan Board upon the subject of water-closets, that it would be necessary to communicate with all the parishes by circular, which would probably occupy about three weeks; but that as soon as the information was obtained it should be supplied to the Committee.

[Adjourned to To-morrow, at Twelve o'clock.

(INQUIRY INTO OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852.")

Thursday, 6th June 1867.

MEMBERS PRESENT:

Mr. Ayrton.	Colonel Hogg.
Mr. Henry Baillie.	Mr. Kekewich.
Mr. Benyon.	Mr. Sclater-Booth.
Lord Frederick Cavendish.	

ACTON SMEE AYRTON, Esq., in the Chair.

Mr. *Edward Easton*, sworn; Examined by Mr. *Cripps*.

Mr. *E. Easton*.

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3397. You are an Engineer, of the firm of Easton, Amos & Sons?—Yes; I am.

3398. During the last 15 years, have you had considerable experience in the construction and in the maintenance of waterworks?—I have.

3399. Have you paid particular attention to the question of providing water on constant service, and the means which could be adopted for introducing that, and for the change from the intermittent to the constant system?—I have.

3400. I believe that among other cases you have been employed, and you have acted in conjunction with your father as engineer to the Brighton Company?—I have had the chief management of anything that has been done in the last 10 years, I may say, with regard to the Brighton waterworks.

3401. When was the Brighton Act for constant service passed?—In 1852.

3402. Mr. *Denison*.] Have you got that Act?—Yes; it is here (*handing in the same*).

3403. Mr. *Cripps*.] In 1853, I believe, the company obtained another Act to enable them to purchase the existing waterworks at Brighton, and to extend their works generally?—It was passed in 1854; it received the Royal Assent on the 12th of May (*handing in the Act*).

3404. Under those several Acts, did the company, having become the purchasers of the old waterworks, begin to supply constant water to the houses which had been fitted for the intermittent system?—They did; and they found the waste so great in applying the constant service to the intermittent apparatus that they then applied for an Act of Parliament, a third Act, which was passed in 1857, to give them more stringent clauses than those contained in the Waterworks Clauses Act of 1847, and in their first Act which they obtained; that third Act is here (*producing the same*).

3405. Will you refer to a special provision which there is in that Act, which was added, specially applicable to the Brighton Company?—After reciting the clauses of the Metropolis Water Act of 1852, three of the clauses, I think, are nearly word for word the same as the protective clauses in the Metropolis Act. We obtained another clause, the 5th clause; I will read the 4th clause first, "Every person supplied with water by the company who shall wilfully suffer any such pipe, cock, cistern, or other apparatus, to be out of repair, so that the water supplied to him by the company shall be wasted, shall forfeit to the company

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pany for every such offence a sum not exceeding 5 *l.*" That is in the Metropolis Act, I believe. Then the 5th clause follows, "The company may in such case require such person, by three days' notice in writing, under the hand of a duly authorised officer of the company, to repair any such pipe, cock, cistern, or other apparatus, so as to prevent any such waste of water; and in case of default so to do within the said three days, the company may repair the same; and in such case the expenses of such repair shall be repaid to them by the persons so allowing the same to be out of repair, and may be recovered as damages."

3406. *Chairman.*] How recovered, summarily before justices?—It says no more than that; that is the end.

3407. Does it say simply as damages?—As damages. Then there are two other clauses to provide specially against washing the fronts of houses, which is generally done at Brighton (*handing in the Act of* 1857).

3408. Mr. *Cripps.*] After that Act was obtained, in order to give time for the change, were arrangements made for laying down there a duplicate system, that is to say, for laying down mains for the constant service without removing those that supplied the intermittent system?—There were arrangements made; we were bound under these Acts to give constant service to everybody, and if we had attempted to turn on the water immediately from the intermittent to the constant system, the apparatus we had purchased from the old water company would not have been sufficient to have supplied the water required; this we ascertained by experiment; my father then recommended the company to lay down a duplicate system of mains all over Brighton, which was done, in order that we might be able to give to anybody applying for it a constant service, and at the present moment there is a second pipe in every street in Brighton, so that we are absolutely giving in very many of the streets both constant and intermittent service.

3409. Having in Brighton the double system, the intermittent and the constant, has enabled you to make some valuable experiments about the uses of each?—I have made some experiments.

3410. *Chairman.*] You had better, perhaps, describe first what your system is, and we shall then understand the experiments better, and appreciate them better?—I will do so.

3411. Mr. *Cripps.*] Would you explain, if any further explanation is required, how they are laid down; you have told us that you have the double mains, one for the constant and one for the intermittent system in each street?—We have.

3412. With an opportunity for the owners or occupiers to take their water from either the one or the other?—Exactly.

3413. *Chairman.*] What are the arrangements in each house?—The arrangements we endeavour to carry out are set forth in a series of regulations.

3414. Will you let us have them?—They are first of all as regards service pipes; service pipes are to be made of a strong lead pipe; a half-inch pipe not less than 28 lbs. to the 15 feet length, or in round numbers a little less than 2 lbs. to the foot, or 6 lbs. to the yard, and if five-eighth pipes are used, which is not very often the case, they are 33 lbs. to the 15 foot length; three-quarter inch pipe, 39 lbs. to the 15 foot length, and one-inch pipe 62 lbs. to the 15 foot length. Then, "all pipes within the premises must be so exposed to allow of immediate inspection, as no pipes will be allowed to be placed under the floor, or buried, except where necessary for the prevention of frost. All connections must be made with stout plumbers' joints. Taps; a strong high-pressure stop-tap to be fixed on the service pipe where it enters the premises; and all taps supplied from the company's mains must be high-pressure. Cisterns: All cisterns to be supplied with a high-pressure ball-tap; a waste or warning pipe must be placed two inches below any air pipe to closet, and be so fixed that the overflow, if any, may immediately be seen; no waste pipe will be allowed to lead to a closet, drain, rainwater pipe, or any place that prevents the immediate discovery of the waste. Closets: All closets (Common's high-pressure excepted)" that is a particular form of closet, of which I have brought a specimen here to show to the Committee, it is in frequent use in Brighton, "must be supplied from cisterns with self-closing valve." Then there is a restriction about gutta-percha hose.

3415. *Chairman.*] Is that self-closing valve what we call the double valve system?—Yes, or any self-closing valve; we do not make a restriction there, but we recommend the use of this Common's closets, which is the water waste preventer. "Boilers: All boilers or hot water apparatus must be supplied from cisterns, as in no case will they be permitted to be fed direct from the company's mains. Laying on Water: All the pipes, taps, cisterns, closets, and other apparatus must be approved of by the inspector, and complete before the connection is made to the company's main; it is requested that persons intending to have the water laid on should previously call at the inspector's office, where all requisite information will be given them."

3416. You have not given us yet the exact description of what is done in each house?—I was going on to say that these are the regulations which are set forth by the company, but I have had considerable difficulty in persuading our directors to take the means which, in my opinion, are necessary, and which are in accordance with these regulations in many instances; in some instances they are strictly carried out, and I had experiments made, showing the use of water in those cases where the system has been properly carried out, and other experiments showing where it has been partly carried out.

3417. Will you tell us exactly what is carried out, beginning with the communication pipe?—In the first place there is a stop-cock always put between the main and the house on the communication pipe.

3418. At the nearest point where it emerges from the ground, or near to that? —At the most convenient point, sometimes there and sometimes inside the house; a lead pipe of this weight that is specified is then attached, and in the case of the poorer houses, a big cock is fixed either over a sink or not over a sink, as the case may be; they are done in both ways, and in the case of a closet being put on, one of these self-acting closets, or Common's closet apparatus is attached to the closet in the poor houses.

3419. Is the tap over a sink in the house generally, or out of the house?—In the house where the house itself is supplied, but in very many instances that is not the case; I need not say that we have a very poor population in some parts of Brighton, and in those cases, the courts are supplied by a tap standing out in the open court.

3420. Is that to be understood as the rule in Brighton, that where there are courts there is a tap in the court, accessible to the occupiers of the court without a service in each house?—In the courts that is the rule; but there are very many streets with quite poor houses, houses of 5 *l.* and 6 *l.* rateable value, which are supplied with tops in the houses also.

3421. In each house?—In each house.

3422. Has each house a water-closet, or have the courts one in common, or have two or more houses one in common?—Generally speaking a house of the lower class has a closet of some sort, or a privy or something or other; but frequently in the small poor courts, there are one or two closets common to them all.

3423. Are those closets with a flushing apparatus, or are they mere privies?—They are sometimes privies, but generally speaking, I find what is liked best in Brighton, amongst the poor houses, is the Common's closet, or rather a pan with a common syphon tap, and then flushed by hand with a pail; Mr. Arthur Wagner has just built a row of houses, I have the particulars here, it is in Washington-street, and he preferred after going into the whole matter, fitting up the houses with one big cock, so that they might draw the water when they liked; this street is on constant service; the closets are made of a simple closet and pan, and then the occupant of the house throws down a pail at certain times of the day, and they use a broom or brush very much as they do in France, and wash it out when it is necessary.

3424. In those houses, is there a closet in every house?—Yes, there is a closet in every house; I have the result of the experiment in that street in particular.

3425. What are the communication pipes in this case?—Half-inch pipes.

3426. And, therefore, half-inch taps?—Yes, I think I am right about it; I have the inspectors from Brighton here, in case any details may be asked more than I can give.

3427. Will you ask him what those pipes are?—The inspector says they are half-inch pipes.

3428. Mr. *Cripps.*] As we are upon that part of the case perhaps you will explain the apparatus you have here—the waste-preventer; you have turned your

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your attention to the mode of preventing waste in water-closets?—Yes, there are several methods; this happens to be the one that we have used at Brighton; it was to a certain extent invented by a manager we had; an inspector who is dead now, his name was Common, and I believe it is in principle very much like a great many others which were invented about the same time, that is, 10 years ago. This is the one we have used (*producing some apparatus*): it is very much like another one which has been mentioned here. I think Mr. Grieves mentioned it; that is a drawing of this one (*producing a drawing*); it consists of an air vessel which is there (*pointing to it*), into which the water is admitted through a small valve, and this is the supply pipe from the main; the half-inch supply pipe. Inside here there is a little valve on the end of the spindle; the other end of this spindle is attached to a lever which is pulled up in the usual way, and has a weight to bring it down again of itself. Also, inside here, on the same spindle there is a valve which is open now; that shuts. Now this pipe goes to the closet to the pan, which is also a very nice and efficient pan inside. The action is this, as it is at present, the valve to the closet is closed, and the valve to the main (a little bit of a valve very much like that, with a hole in the ferrule) is open. The water is now running into this air vessel, and it compresses the air equal to the pressure on the main; that air vessel may be made to hold anything you like; in that case it holds seven quarts. When you are putting this into action you pull up this valve and out goes the whole of the water at once, under the whole of the pressure which has ever been upon it, into the pan and thoroughly flushes it. According to the size of the hole or the pressure it fills in two or three minutes. (*The Witness explained the apparatus to the Committee.*)

3429. *Chairman.*] The compressed air throws the water out into the pan?—Yes.

3430. Mr. *Cripps.*] Though they were to hold the handle up continuously or to prop it up, the waste would not go on?—No water can go in as long as the handle is up.

3431. *Chairman.*] It would discharge the contents of that, minus the air compressed in the top, and no more?—Yes.

3432. Mr. *Cripps.*] When the handle is let go again, the flow comes in slowly again, does it not?—Yes, it comes slowly from the main, and rises up into the air vessel.

3433. Mr. *Baillie.*] What is the cost of that apparatus?—The cost, including the pan and the syphon-tap, is 38*s.*, and it would cost probably another 6*s.* or 7*s.* to fix it, but that includes the pan and the syphon tap; without the pan (that might be attached to another pan) it would be about 37*s.* fixed.

3434. *Chairman.*] Is that in general use?—It is in general use where the constant service is laid on to water-closets.

3435. Lord *Frederick Cavendish.*] Can you insist upon its use?—Yes; we can insist upon that under the provisions of our Act.

3436. Mr. *Kekewich.*] That would not be necessary with a cistern, would it?—No.

3437. *Chairman.*] That is a cistern?—Yes, it is a cistern; it acts as a cistern, only it is a small one; it is a pail; you may look upon it as a pail which is thrown down by mechanical means.

3438. Colonel *Hogg.*] Is that cheaper than a cistern?—No, I rather think that a double valve cistern can be supplied at less than that.

3439. Mr. *Cripps.*] When the lever is let down again, about how long does it take to fill the cistern again by the small hole?—As this is arranged, and under a head of say 100 feet, or something of that kind, it takes two minutes. That is how it is fixed at Brighton, but it might be made 20 minutes, or it might be made one minute.

3440. That is controlled by the little ferrule?—By the size of the small hole in this part in the supply pipe?

3441. *Chairman.*] The valve?—Yes.

3442. Mr. *Cripps.*] You have a table showing generally the result of the adoption of the constant system since people have had the choice of the two, I think?—I have a table showing how many people have come on to the constant service, or rather how many services we have.

3443. That is from the year 1862 downwards to 1866, I think?—For the last five years I have taken it out, because we have begun to put them on more

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frequently during the last five years. This is a table showing the number of services, constant and intermittent (*producing the same*). In 1862 we had a total number of 13,483 services, and at that time we had 722 only on the constant, and 12,761 on the intermittent. They gradually increased, of course, on the constant, and in 1866 we had 2,032 on the constant, and 13,091, on the intermittent. I have also added here the average daily supply that we have pumped. We pumped 1,200,000 gallons in the year 1862 per day, including Sundays, and in 1866 we pumped 1,488,000 gallons. The total number of gallons per day for each service or house was, in 1862, 89 gallons, and in 1866, 98 gallons.

3444. Mr. *Cripps.*] Did you give the total in 1866 as 1,600,000 or 1,400,000 ?—1,488,000 is the correct figure.

[*The Table was handed in, and is as follows:*—]

BRIGHTON WATERWORKS.

TABLE showing Number of Services and Consumption of Water.

YEAR.	SERVICES.		Total.	Average Daily Supply.	Total Number of Gallons per Day for each Service.
	Constant.	Intermittent.			
				Gallons.	
1862 - - -	722	12,761	13,483	1,200,000	89
1863 - - -	835	12,944	13,779	1,200,000	87
1864 - - -	1,049	13,280	14,329	1,300,000	90
1865 - - -	1,343	13,422	14,765	1,350,000	91
1866 - - -	2,032	13,091	15,123	1,488,000	98

3445. Mr. *Benyon.*] In 1862 how many gallons did you supply to each house ?—Eighty-nine per house, and in 1866, 98 ; I think that the last large consumption is due to some special cause, because the way in which the table runs is this, in 1862, 89 gallons in 1863, 87 gallons ; in 1864, 90 gallons ; in 1865, 91 gallons ; in 1866, 98 gallons. I think probably that our supervision is now getting rather too little for the number of houses, and that if we put on another inspector we shall reduce that again to the 89 gallons, or something like that.

3446. *Chairman.*] How many inspectors have you ?—Only one.

3446*. Mr. *Cripps.*] That shows, then, a considerable increase of the constant, nearly three times, and no considerable increase of the intermittent in these years ?—A very small increase on the intermittent, only about 200, and on the constant 1,300 ; I have dissected that to a certain extent, to show what have come in of the low class of houses on the constant, and what on the intermittent, and I have the results here also. The result shows that the majority of houses which are rated under 20 *l.* a year have been laid on to the constant service. I will hand in this table.

[*The same was handed in, and is as follows:*—]

BRIGHTON WATERWORKS.

TABLE showing Number of Services—Constant and Intermittent.

	CONSTANT.					INTERMITTENT.				
YEAR.	£. 2 to £. 5 rating.	£. 6 to £. 10 rating.	£. 10 to £. 20 rating.	Above £. 20 rating.	TOTAL.	£. 2 to £. 5 rating.	£. 6 to £. 10 rating.	£. 10 to £. 20 rating.	Above £. 20 rating.	TOTAL.
1862 - -	58	144	179	341	722	930	4,154	3,154	4,523	12,761
1863 - -	76	157	233	369	835	954	4,106	3,217	4,667	12,944
1864 - -	92	188	314	455	1,049	993	4,188	3,208	4,891	13,280
1865 - -	107	265	425	546	1,343	1,062	4,224	3,189	4,947	13,422
1866 - -	203	466	756	607	2,032	934	3,989	3,105	5,063	13,091

3447. Have you had many new houses of that class built in those five years?—Yes, a great number; I think the chief of those that have been put on the constant service have been the new houses.

3448. Mr. *Cripps.*] Do you find that the new houses do have the constant service?—Generally they take the constant service, because the fittings are cheaper, and it is, in fact, wholly a question of the cost of fittings in this case; when anyone applies to be put upon the constant system who is already upon the intermittent system, we are obliged first of all to say, "Now you must change your service pipe from the intermittent pipe to the constant pipe;" and then of course we also enforce all those regulations invariably upon the constant service. That puts a man to a considerable expense, and consequently we get fewer applications than we should if they were new houses.

3449. Having both systems, has that enabled you to ascertain the consumption per head, or per house, under the two different systems?—Yes, I have had meters put upon the different streets in Brighton, and the results are as follows: the first is a small street, the street that I referred to just now as having been built by Mr. Arthur Wagner, Washington-street, in which there are 90 houses, at 11 *l.* a year rating on the constant service, used 16,000 gallons in a week; the quantity per house was 25·38 gallons, the average number of persons in each house was seven, and the quantity of water consumed was 3·62 gallons per head per diem; those houses have been newly fitted up, they have a half-inch screwed-down tap over a sink, and they have water-closets flushed by hand, by pail, that is on the constant service.

3450. There is no cistern to the water-closets in those houses?—None; there is no cistern in the house whatever, they draw the water whenever they like, and as much as ever they like.

3451. Would each of those houses have a single tap?—Yes, each house has a tap over a sink.

3452. Then your 3·62 gallons includes what you assume to be used for the water-closet as well as the other consumption used in the way you speak of by pail?—It includes everything, not only the water used, but the water wasted in every shape, from the time it leaves our mains until it gets into the drains, or wherever it does go.

3453. Will

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3453. Will you go on to other instances?—The next is on the intermittent service; a street containing 124 houses, from 8 *l.* to 10 *l.* rating; we tried it for five days on the intermittent service, and for five days on the constant service; this is a street that is generally on the intermittent service; they have there chiefly privies, no water-closets at all, but old-fashioned privies; there are about 12 of those out of the 124 houses with Common's closets attached, and the rest of the houses are flushed by the pail in the way I described before; they used 4·64 gallons per head.

3454. Lord *Frederick Cavendish.*] On the intermittent system?—On the intermittent system; and when we turned them on for another five days to the constant system, while exactly the same thing was going on, they consumed 6·19 gallons.

3455. Mr. *Cripps.*] When you gave me the first experiment, you said all those fittings were new and in good order?—Yes.

3456. How were they in the last case?—Some required looking to; they being on the intermittent service, our inspector does not go to examine them so often as he does to the constant service; they are to a certain extent out of order, and want looking to. Then I have an instance of a better class of house; houses rated at from 60 *l.* to 100 *l.* in Holland-road; we tried that for three days; those are quite new houses; 12 of them are occupied; they used 166·66 gallons per house, and 18½ gallons in round numbers per head per day. Those houses have two water-closets of the Common's sort, that is to say they work with a self-closing valve, and they have a servant's water-closet fitted up in this way (*pointing to the apparatus produced*); they have cisterns and every apparatus, in fact, that anybody has in a house.

3457. Do you mean that there are two water-closets in each house?—There are three; we have no power of charging extra for water-closets in Brighton, so they have just as many as they like; I tried another row of 52 houses on the intermittent service.

3458. Mr. *Denison.*] Of the same kind; 60 *l.* to 100 *l.* houses?—No, this is another case; these are about 30 *l.*

3459. Was the last constant or intermittent?—The last was constant, and they used 166·66 gallons per house per day.

3460. *Chairman.*] These are 30 *l.* houses?—36 *l.* on the average; I tried 52 of those, and the result was on the intermittent service; they consumed 21·7 gallons per head. They have one good water-closet fitted up with a self-closing valve, and one old-fashioned hopper water-closet, with a common turn tap, simply a stop-cock, which is very wasteful.

3461. Mr. *Cripps.*] There is one further experiment, I believe?—We tried another small street of very poor houses from 4 *l.* to 5 *l*; we picked it out as being one of the poorest streets in Brighton; it was laid on last year by order of the Corporation, under the Sanitary Act of 1866, and it has been in operation about a twelvemonth; there are 48 houses; they use 11¼ gallons per head per diem on the constant service; 36 of those houses have the water in each case into the house; 12 of them are fitted up with Common's closets, and the rest are chiefly flushed by hand; they all have closets, and all have water, but they draw the water at the taps for other purposes; the remaining 12 houses, that have not a tap laid on to each, are supplied from one stand post in the court; there is a court attached to this little street, but that cock, when I measured it myself, was running at the rate of from 180 to 200 gallons a day, showing that it was time our inspector went round that district again.

3462. *Chairman.*] It was left open?—It could not be closed tight; it was defective; I did not go into every house, but I have no doubt there were others in the same street also defective; that was on the constant service.

[*The Table referred to was handed in, and is as follows:—*]

BRIGHTON WATERWORKS.

METER TESTS of the Consumption of Water on the Intermittent and Constant Service.

NAMES of STREETS.	Service.	Rating of each House.	Duration of Experiment.	Quantity Consumed in that Time.	Number of Houses.	Quantity per House per Diem.	Number of Persons in each House.	Quantity of Water Consumed per Head per Diem.	REMARKS.
		£. s. d.		*Gallons.*		*Gallons.*	*Average.*	*Gallons.*	
Washington-street, and six houses in Islingwood-road - -	C. S.	11 - -	One week	16,000	90	25·38	7	3·62	New fitted up, all in good c
New England and Bath-street - -	I. S.	8 - - to 10 - -	Five days	18,000	124	29	6·25	4·64	Fittings require some repai
Same as above - -	C. S.	- ditto -	- ditto -	24,000	124	38·7	6·25	6·19	Ditto - - ditto.
Holland-road - -	C. S.	56 - - to 96 - -	Three days	6,000	12 Occupied	166·66	9	18·52	Fittings, chiefly in good have not had anything them for some time.
Park Crescent - -	I. S.	28 - - to 42 - -	- ditto -	15,000	52	96·1	4·42	21·7	Fitted with Wasteful S Stopper Water-closets Common Traps.
Little St. James's-street - - -	C. S.	4 - - to 5 - -	Four days	8,000	48	41·66	3·7	11·25	Many of these taps require them was leaking, wher pletely closed, at the from 180 to 200 gallons d

3463. Mr. *Cripps.*] Where you find waste of water, do you ordinarily find that that does occur most amongst the poorer classes of houses, or not?—No; I think this table speaks for itself, that the chief waste of water, whether on the constant or the intermittent service, per head, is amongst the better class of houses.

3464. *Chairman.*] Are there any baths in the better class of houses?—There are in the Holland-road.

3465. Those would have to be taken into account?—I only meant that per head they use more in the better class of house than they do in the poor ones.

3466. You said waste?—And waste, too, I have no doubt.

3467. Where is the evidence of waste?—The evidence that I have as regards that is drawn from houses not at Brighton, because we have not an opportunity of ascertaining it, but in London.

3468. What is the charge of a bath in gallons at Brighton?—If it is a full-length bath it would probably hold 45 or 50 gallons, perhaps 60; I think 60 is the limit put by the Act.

3469. Then that would make up all the difference, would it not?—Yes, but a full length bath is not frequently used; it is very seldom used in a house; the chief practice is to use hip baths and sponge baths, which take probably four gallons or two gallons as the case may be. I have made experiments in my own house, and in two or three houses of friends in London, and I find that the consumption on the average, with every appliance fitted in the same way as these houses I have described in Holland-road, does not amount to more than 12 gallons a head, day after day, in London; that is an ample supply, the rest is waste, I have no doubt.

3470. Mr. *Cripps.*] Then I understand you to say that you have no special means of speaking to the waste (the question I asked you before) as between the better and the poorer class of houses at Brighton; you cannot tell what is due to waste particularly there?—No, not exactly. I only know we find that there is waste going on in the better class of houses continually; the inspector finds that.

3471. You spoke of changing from the intermittent to the constant service; you

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you mean that that was done where the fittings were adapted for the constant system, or where the fittings adapted for the intermittent system are still remaining?—In both cases.

3472. You tell me that, to some extent at Brighton, the fittings which had been adapted for the intermittent system, originally were used for the constant system?—Certainly.

3473. Can you tell whether the waste in the better class of houses is in those houses where the change has not been completely made?—No, I am not able to tell that.

3474. I am not sure whether you gave the explanation before; you explained to the Committee how you supply water to the houses generally, and you recommend them to supply it to houses under 10 *l.* rent?—Under 10 *l.* value; at Brighton those houses are supplied in the way I explained, with reference to Washington-street, and that no doubt is the best way, namely, to put a tap either over a sink, or not, as the case may be. I do not much care about that, and to put a common water-closet pan with a syphon tap, and let that be flushed with a pail, I believe that would be found to be the best for the poorer classes in London also.

3475. That is where the result, according to your table, was about 3½ gallons per head?—Exactly.

3476. Cisterns, you say, remain very generally in Brighton?—They do.

3477. With overflow pipes, of course?—With overflow pipes.

3478. In those cases is it one of your regulations that the overflow pipe, the waste pipe, should be in a conspicuous place?—It is; and we endeavour always to enforce that regulation, but sometimes it is difficult; generally speaking, when the closet is near the outside of the house, the overflow pipe is brought through the wall of the house, so that the water falls into the courtyard, and the inspector can see whether the ball-cock is stuck up, or anything which would enable the water to flow over the waste pipe, and flow away; in every case where we can enforce it we endeavour to enforce the rule that the waste pipe shall not go into a drain or a soil pipe, so that it cannot be seen.

3479. With regard to the kitchen boilers, you have explained that before?—They must be supplied from the cistern.

3480. Having had both systems a good deal under your charge, you can speak generally as to your opinion of the advantages, particularly with regard to the poorer classes of houses, of the constant system over the intermittent?—I think very strongly that every poor house ought to be supplied upon the constant system, in the interest of the tenant, decidedly; it is imperatively necessary, I think. There are several houses at Brighton of the poorer sort that I have seen myself that are on the intermittent system; our intermittent system is not what the London intermittent system is, we turn it on for four hours daily at each house, and the people are, I believe, during the remaining 20 hours very badly off for water; no doubt they let the tap run, when it is turned on they never think of turning it off; they take pails out and catch what they can. That, no doubt, wastes a great deal of water; I believe in such cases that it would be to the interest, not only of the consumer, but of the company, with proper regulations, that it should be laid on on the constant system.

3481. Do you consider it desirable for the poor, with reference to their comfort, to have the water, after being supplied, kept in storage of that kind?—No, certainly not; it is not only my opinion, but the opinion of everybody who knows anything about the poorer class of houses, that a cistern is a great evil; either in London or elsewhere, it is sure to be contaminated.

3482. Your inspectors are employed from time to time, are they not, in inspecting the houses where you have the constant system?—They are always going round the town.

3483. Do you find that that gives rise to any great amount of dissatisfaction? —We sometimes have complaints, but very seldom; we generally find that the people do not complain so much of the inspectors going to the house in a place like Brighton, but as soon as a fitting is found out of repair, and the gentleman is asked to mend it, then he begins to complain; we had one or two cases last week; one gentleman was very willing that our inspector should go, but when it turned out that the ball-cock was out of order, he was not so pleased that he should have to repair it, and he complained to the Board, and wrote a letter about it; with the poorer class there is no difficulty, because you can walk in and

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and see the tap in every case. I went into a number of houses myself last week without the slightest difficulty.

3484. You do not find any objection or resistance made by the poor to that inspection?—Not the slightest, they were only too willing that the thing should be investigated.

3485. At about what pressure is your service at Brighton?—We have four different zones at Brighton, four different pressures varying from 10 feet above the sea, up to 470 feet; the average pressure upon each level, the height rather of the reservoir above the floor of the house, would be about 150 feet in each case.

3486. And your charge at Brighton is what?—Ninepence in the pound on the rateable value for every class of house, poor as well as rich.

3487. You have houses there rated as low as 1 *l.* I believe?—Absolutely as low as 1 *l.*

3488. Do you supply them at the same price?—Yes, they only pay the 9 *d.* of course; I need not say that it costs us a great deal more.

3489. *Chairman.*] Do you mean that the 1 *l.* is the annual value of the house? —I have the details; there are 17 houses in Brighton which are rated only at 1 *l.*, they only pay us 2¼ *d.* a quarter for water.

3490. What is the annual value of the house?—I suppose it would be only 30 *s.*; I do not know.

3491. Mr. *Kekewich.*] Is that the rent?—I do not know what the rent is; it cannot be much more.

3492. *Chairman.*] That is not so much as 1 *s.* a week rent?—No; there are, I think, 60 houses rated at 2 *l.*, and a great number rated at 4 *l.*; there are some very small houses indeed at Brighton, in the back streets.

3493. Mr. *Cripps.*] Have you considered what plan would be the best to adopt in the case of courts, where the landlord owns several houses?—I think, that in London the best plan of all would be to supply the water by meter to the landlord himself, and in this way; not that he should pay so much per 1,000 gallons for every gallon that is used, because in that case he would take care that the poor did not get it probably, but that he should pay the same rate he now pays, for a minimum quantity of, say 25 gallons per room, or 50 gallons per house in a case where the house is occupied by only one family; and for any excess beyond that quantity that the meter shows, he should pay at a certain fixed rate per 1,000 gallons.

3494. Under any circumstances, he should be compelled to take a certain quantity?—To pay for a certain quantity, and the company should be compelled to give a certain quantity.

3495. And that you would put as about 25 gallons per room?—Twenty-five gallons per room; I am taking now the case of lodging-houses, with a number of rooms or families in them, say 25 gallons per family if you like, or 50 gallons a house; I think Dr. Letheby, in the regulations for the City, puts it at 50 gallons a room, and Westminster puts it at 25 or 30 I think, I am not sure which, according to their regulations under the Sanitary Act of 1866.

3496. What you suggest from your experience as being the better plan with regard to the meter, that it should be supplied to the landlord, or that the company should furnish it under a rentcharge?—If the landlord chose to pay for it let him of course put it in; otherwise I should think the company ought to provide it and charge 10 per cent. on the outlay, including the maintenance of it. They can get a meter kept in order by the makers for 5 per cent. per annum, and the other 5 per cent. would pay them for the outlay.

3497. Supposing that is found impracticable, what would you say to supplying a certain quantity only through a ferrule per day?—That would be a very good way, and it is found a good plan where there is an apparatus of this sort (*pointing to the apparatus produced*); a water waste preventer, so that the poor people can draw four or five gallons at a time, and they have not to wait whilst it dribbles into the pail, which of course is inadmissible. That is a rougher plan than the other.

3498. *Chairman.*] What is a pailful in gallons?—A gallon and three quarters to two gallons.

3499. Mr. *Cripps.*] You have made considerable inquiries, I believe, with reference to the supply of water to the poorer parts of the metropolis?—I have made certain inquiries. After this Committee had begun to sit, I employed a

man

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man to go round to certain poor districts in London. He brought me the particulars of about 400 houses in different parts of the metropolis. I had sent him round for this reason; I wished to know how the poor were at present supplied, what sort of apparatus they had, and so on, in order to enable me to form a judgment as to how it might be remedied, and I have the results of that inquiry. There are no mains here; I have all the details myself; I have the name of every street, and the owner and everything, but I have not put that here. I have divided it into three classes. I will begin with the poorest class. There are 220 houses in a series of 16 courts; the families in those 220 houses were 648.

3500. *Chairman.*] In what part of London is that?—There were some houses in Bethnal Green, some in Southwark near our own works, and the Mint, some in the City, in Whitecross-street, and there were some in St. Giles, I think. There were six localities; I told the man to pick me out a certain number of streets or courts in each of those localities to enable me to form a general judgment.

3501. Mr. *Kekewich.*] What is the annual value of the lowest class of houses?—Those are generally large houses of six or eight rooms containing a number of families; I dare say the annual rental that would be paid for such a house would be 40 *l.*, 50 *l.*, or 60 *l.* a year.

3502. *Chairman.*] Will you hand that table in?—I will.

[*The same was handed in, and is as follows:—*]

ABLE showing the Amount of Storage for Water, and the proportion of Water Closets in the Poorer Houses of London.

No. 1.

ber es.	Families Supplied.	Cisternage Gallons.	Storage per House.	Storage per Family.	Water Closets Supply Laid on.	Water Closets Flushed by Overflow.	Water Closets Flushed by Hand.	REMARKS.
	14	800	57	57	- -	2	3	The localities were selected from different quarters of London, the houses being generally of the lowest class, mostly lodging houses.
	16	636	40	40	- -	- -	16	
	5	324	65	65	- -	3	1	
	20	1,172	58½	58½	20	—	—	
	34	2,150	63	63	34	—	—	
	11	834	76	76	- -	- -	11	
	15	600	60	40	- -	4	—	
al	Total	Total	Average	Average	Total	Total	Total	
)	115	6,516	60	57	54	9	31	

TABLE showing the Amount of Storage for Water, and the proportion of Water Closets, &c—*continued.*

CLASS 2.

Number of Houses.	Families Supplied.	Cisternage Gallons.	Storage per House.	Storage per Family.	Water Closets Supply Laid on.	Water Closets Flushed by Overflow.	Water Closets Flushed by Hand.	REMARKS.
12	18	524	43½	29	4	- -	2	
15	39	900	60	23	5	3	2	
5	17	400	80	23½	5	—	—	
8	8	264	33	33	- -	- -	3	
10	30	720	72	24	10	—	—	
7	14	400	57	28½	7	—	—	
4	8	200	50	25	4	—	—	
3	6	200	66	33	1	—	—	
Total 64	Total 140	Total 3,608	Average 57⅝	Average 27⅜	Total 36	Total 3	Total 7	
CLASS 3.								
14	35	480	36	13½	2	- -	4	
6	30	300	50	10	- -	- -	4	
6	6	80	13½	13½	- -	1	—	
6	6	80	13⅓	13½	- -	1	—	
24	60	538	24	9	- -	3	5	
3	6	- -	- -	- -	- -	- -	1	
8	8	160	20	20	- -	- -	8	
15	15	- -	- -	- -	- -	- -	15	
12	12	- -	- -	- -	- -	- -	15	
17	60	264	15½	4½	- -	- -	14	
29	116	400	14	3½	2	- -	21	
11	14	186	17	13	- -	- -	11	
18	36	324	18	9	- -	- -	18	
13	32	424	33	13¼	- -	- -	10	
17	68	1,300	76	19	17	—	—	
21	144	2,200	105	15	- -	- -	21	
Total 220	Total 648	Total 6,736	Average 30½	Average 9½ nearly	Total 21	Total 5	Total 147	

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3503. Mr. *Cripps.*] You were going to say something about that table, I think?—The houses of this first class had quite enough water to supply them properly, the second and third had not, the third manifestly not; they had $9\frac{1}{2}$ gallons nearly storage per family, and when the water was turned off they had no more until the next day. As to those houses in the second and third classes, it is in my opinion absolutely necessary to supply them with a constant service in some way or other.

3504. Mr. *Kekewich.*] When you talk of flushing by hand what do you mean; filling a pail with water and throwing it down?—Yes.

3505. *Chairman.*] What do you mean by "flushed from overflow," is that the overflow from the cistern?—In those houses which are mentioned here only 18 have an overflow pipe from the cistern brought down into the pan.

3506. Then if the ball-cock is in order there is no overflow?—Of course in a cistern so small as this there never is an overflow.

3507. Then what is the good of them?—None whatever; I do not suppose the overflow pipe has delivered a gallon of water for several years in some of these cases.

3508. They use a pail for flushing the water-closet?—Yes.

3509. When it is very foul they pour water down to clean it?—Yes.

3510. Mr. *Cripps.*] Then, except just when the supply is going on on the intermittent system, the overflow could only take place by the drafting out of these small cisterns?—That is all; in making inquiries both in Brighton and London, I think I may say that I found the majority of people living even in those places preferred flushing it with a pail, and the medical officers also, one in particular, in our own district of Southwark, told me that he would rather have it flushed with a pail, in that way, than have any water laid on to the water-closet at all, because those people are, many of them, so very filthy in their habits, that they will always stick things down the pan, and when it is choked, and the water is on, it is worse than if the water were not on, for it overflows the seat, and runs all over the place, wherever it may be.

3511. Colonel *Hogg.*] Do you find that they flush it by hand?—Wherever it is flushed I think, I may say, that there is somebody, some woman or man appointed by the landlord, living in the court, to look after it; they live rent free sometimes in a room near, that is very often the case.

3512. Mr. *Cripps.*] Have you formed any opinion upon the system of inspection, about how many houses could be properly and efficiently inspected by one officer in the course of a year?—I believe you could efficiently inspect, twice a year, 3,000 houses of the better class, and about 5,000 or 6,000 of the poorer class; and if the company do what, in the country especially, it is clearly my opinion that they should do, namely, undertake the supply and repair of the fittings, the inspectors might do all the small repairs at the same time, that is to say, they might keep all the screw-cocks in order, and put new leathers in or do any little repairs of that sort at the same time.

3513. Assuming that waste could be prevented, have you also formed an opinion about what would be a sufficient ordinary supply per head per day?—I have; I believe that 15 gallons per head per day through the week, would supply any house in London, any house at least of a class up to say 150 *l.* rental; I think above that, probably, where there are two or three baths, a larger supply per head ought to be given, because necessarily in a larger house there is more washing, and everything is more lavish, of course; my reason for thinking that (it is not altogether thinking) is this, I have had an experiment made in my own house, which is near Russell-square, of a rental of 120 *l.* per year, and one at a house where my brother lives, in Montagu-square, and the house of a friend who lives in Euston-square; I took it for a week, and measured the absolute contents of the cistern, and how much was filled, and the result of that experiment was that, at my own house, we used every day 80 gallons, or 11 gallons and a little over per head; at my brother's house they used 102 gallons, or 11 gallons per head, counting four children as two adults.

3514. *Chairman.*] That is a new mode of computation; you had better count them all, or otherwise we shall have no means of comparison?—Then if you take the four children as four persons, it would be $9\frac{1}{2}$ gallons instead of 11, and at the third house they used 11 gallons per head, but in that case there was a ball-cock out of order, and when the water came in, a certain quantity of it was wasted every day.

3515. Mr. *Cripps.*] Would those experiments then lead you to the belief that there is a considerable waste in London under the intermittent system?—I am quite certain that the water pumped by the companies is not fairly used by the consumers; that I am quite certain of; that was taken for a week, including the Sunday; the cisternage is large, of course, in this class of houses, containing four or five days' supply in each case.

3516. Assuming the fittings to be in order, that would, of course, represent the quantity that would be required under the constant service system?—Certainly; my fittings have not been touched I know, for eight years, by anybody; I do not know about my brother's house because he has not lived there so long; that is to say, no repairs have been done to the fittings in my house.

3517. Now let me ask you upon another point, which is the cost of the alteration from the intermittent to the constant service; you have heard what the engineers of the Water Companies generally say; that the whole of the communication pipe generally will have to be renewed; in your opinion, would that be necessary?—I think that that has been rather overstated, not as to the fact of its being necessary in some, or perhaps many instances, but in taking the 470,000 houses, and saying that the whole of those will necessarily have to be replaced with a new communication pipe; of course, I have no direct evidence to give upon that point; it is impossible for anyone to say what pipes there are in the different houses without making an inspection, but I believe it will be found that all the better class of houses, say houses above 80 *l.* a year rental, which have been built within the last 20 or 30 years, have been fitted up with pipes very similar in weight to those we prescribe at Brighton; one reason I have for thinking so is, that in the course of our business we make lead pipes, and we supply about 1,200 tons a year of lead pipes to people in London and elsewhere, and of those 1,200 tons, about 400 tons are the $\frac{3}{4}$ inch and $\frac{1}{2}$-inch pipes that we are speaking of; for we have supplied them for more than 70 years; my father and his firm have supplied Mr. Thomas Cubitt, for instance; every pipe he has had, I believe, has come from our works, and seven-eighths of that quantity at least that he has had from us have been of the weight, or nearly of the weight, which is specified in our Brighton regulation; I will tell you exactly; it has been 22 lbs. per 15 feet for the $\frac{1}{2}$-inch pipe, and it has been 32 or 36 lbs. for the $\frac{3}{4}$-inch pipes; and for the inch pipe 52 and 56 lbs. and we have also supplied Messrs. William Cubitt & Company for some time.

3518. *Chairman.*] When did the practice of making and selling the cast pipes cease?—My father put up our present hydraulic press for forcing it in 1830, or thereabouts.

3519. When did the practice of selling cast-pipes cease?—Long before that, I should think; I do not know. I should think, probably at the beginning of this century.

3520. Do you think that all the pipes since then, have been either drawn or forced?—I am sure of it; for the last 40 years they have either been manufactured by hydraulic pressure or drawn.

3521. Is there any difference in the relative strength of drawn and forced pipes?—Yes, the forced pipes are certainly the stronger.

3522. In what degeee?—I have no means of telling that; I think it, to a certain extent, stands to reason the lead is more closely compressed in coming out. The press we use in making it is equal to from 800 to 1,000 tons.

3523. What is their relative strength compared with cast pipes?—I have no means at all of judging; cast pipes are things I have seen very few of; they are very rare now.

3524. Are there not a good many of them in the London houses?—In some of the old houses you would probably find them.

3525. You cannot tell us what is the relative strength of them?—I have not the slightest notion; I think they would be much stronger than anything we use now.

3526. Mr. *Benyon.*] Do I understand you to say that the half-inch pipes weigh $1\frac{1}{2}$ lbs. per foot?—Yes, this is lighter than that: this is lighter than the Brighton pipe, slightly.

3527. The Brighton pipe, I think was 2 lbs.?—No, a little less than 2 lbs.; 28 lbs. to the 15 feet, and this pipe will stand 150 or 200 feet of pressure very well indeed.

3528. Are those specimens of what you have been supplying?—Yes, these are the very things (*producing certain specimens of pipes*).

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3529. Mr. *Cripps.*] Then so far as your experience goes of the kind of pipes which have been supplied by your firm, in your opinion these would not require renewal for the constant service?—Certainly not.

3530. *Chairman.*] Provided the head was how many feet?—Provided the head did not exceed a constant pressure of 150 feet, I think I may put it.

3531. Mr. *Cripps.*] Then when the communication pipes would not require renewal, what would require to be done?—In that case the waste pipe ought to be altered; the waste pipe of the cistern ought to be brought out into some conspicuous place.

3532. *Chairman.*] So that the water would flow in some conspicuous way?—Exactly, so that it could be easily seen by the inspector.

3533. And leave a trace behind it?—That would be better still, but I would not insist upon that even. It would be inconvenient to anybody to have water flowing down in an outside court or a back yard; and it would naturally call attention to the fact that waste was going on, and make the continuance of the waste to a certain extent a matter of wilful negligence.

3534. Mr. *Cripps.*] How about the ball-cocks?—They ought all to be looked to, and if out of repair should be renewed. I think it very probable that in the great majority of houses the ball-cocks would have to be renewed; they would not in my house, but in many cases they would.

3535. Looking to all those alterations of ball-cocks and taps and waste pipes, assuming those to be all the alterations that would be required, what would be the expense per house, about how much?—The cost at which the ball-cocks could be renewed would depend upon the size of them, for the half-inch size 5 *s.* would pay for a ball-cock quite well, and for a three-quarter inch it would be about 2 *s.* more, making 7 *s.* The cost of altering the overflow pipe and bringing it through the wall, would of course all depend upon where the cistern happened to be; in many houses in London that I am free to say would be impossible, for the water-closet is very often in the middle of the house, even in the better class of houses. I hardly know one where it could be managed easily, and in those cases it would involve some expense for altering the waste pipe, but supposing that you could alter it, as we do at Brighton, we find that something under 4*s.* or 5 *s.* will alter the waste pipe very well.

3536. *Chairman.*] In London all the waste pipes are turned back into the water-closets, below the traps, are they not?—That is generally the way they are done.

3537. Therefore you would have to carry the waste pipe into the kitchen, and let it flow into the kitchen, to remind the servants that something was wrong?—Exactly; that is the only way I can see in which it could be done; in the good London houses, generally the ladies' closet is up stairs, and you could not manage, in that case, to get the waste pipe outside.

3538. That would involve the expense of carrying the pipe down through the whole house?—Yes, it would involve carrying it 40 or 50 feeet; a lighter pipe might be used, at 3 *d.* per foot, but it would cost nearly 1 *l.* more.

3539. Mr. *Benyon.*] You would have to open the walls of the house probably?—It would depend upon how you did it; there is generally a space from the top to the bottom of the house, covered in with a board, so that you can easily get to the soil pipe; in fact, in my own house, I wanted to put in a pipe, and managed it by just putting a cord through, and drawing the pipe up as they paid it out at the bottom; that would easily be done, and would not necessitate the cutting of the walls at all inside.

3540. Mr. *Cripps.*] With regard to the cisterns inside the house would you advise generally, particularly in the better class of houses, that the cistern should be retained?—I would, certainly; I do not see how it is possible to supply the better class of houses without cisterns; I would not be without cisterns myself for anything.

3541. Do you think they might be advantageous also in breaking the pressure of the water sometimes?—It necessarily breaks the pressure of the water, it takes off the pressure upon the draw-off taps, which would be very inconvenient and uncomfortable upon the constant service principle, especially where the pressure is great, and, therefore, the cisterns are useful in that respect.

3542. Although you had a cistern, would it be possible at the same time to have a tap upon the pipe in a house in order to get the drinking water fresh?—That is a point which is always urged against the intermittent system with cisterns, that the water for drinking does not came fresh and pure from the main. I see no objection to there being a pipe direct from the main purposely for that, with a proper screw tap; but in that case I would put no waste pipe under it at all, I would let it run on to the floor.

3543. And let it be simply a tap on the pipe?—Where it is necessary. I should not put one in my own house, my water is good enough.

3544. Mr. *Benyon.*] If you took a pipe from the main, with a tap, for drinking purposes, would you put a meter upon that pipe; otherwise might they not draw from it *ad libitum*?—I should; I would not put a waste pipe under it, but you might have a meter put in the usual way on the house side of the stop-cock if necessary, and then I would have only the precaution that there should be no means of the waste running away; I would let it come on to the floor of the kitchen, or the scullery, or the butler's pantry.

3545. You would not want any separate communication pipe from the street?—No; it could come anywhere out of the pipe which runs from the cistern, anywhere through the house.

3546. Mr. *Cripps.*] Have you considered at all how the constant supply affects the supply of water in cases of fire?—Yes; I can give you the results of our practice at Brighton, which I think is about as well supplied a town, in case of fire, as any in the kingdom. All the mains and service pipes are constantly charged, of course, because we are obliged to give constant service into the houses. Every fire-cock is provided with a screw, to which the hose can be attached, and the hose pipes are kept at the police stations. The turncocks have nothing to do with it, and we do not know or care when a fire takes place. A policeman goes to the hydrant, and sees to it. The natural place to go to when a fire is discovered is the police station, they have there a large reel with the hose rolled upon it; they wheel it away to the place where the fire is with a key which they have with them screw it on in two minutes, and there is a pressure which will send the water over any house in Brighton. They have no fire-engines in Brighton; we have a very efficient police, and they do the whole work of the fire business. We have nothing to do with it.

3547. *Chairman.*] Is the hydrant over a main?—No; we object to having the hydrant over the main; I like in all towns to have the hydrant just inside the kerb, if we have the right of prescribing it.

3548. In the kerb?—Yes; supposing this is the kerb, and that is the roadway, and this is the pavement, (*describing the same*) we put it just inside the kerb there, so that anyone can see it.

3549. It is a little iron trap in the pavement?—An iron box; there are 20 different hydrants, of course Bateman's is a very good one, we have not been in the habit of using them lately, at all events.

3550. You have a branch pipe from the main?—Supposing the main is here, the branch pipe comes from it turning up here, and the hydrant is attached where we like to have it; sometimes we have to put down 20 feet of pipe to the main.

3551. Is your hydrant so constructed that you have to introduce an intermediate stand-pipe to screw down the valve; or can you take the hose at once and screw it into the hydrant?—In the case of Brighton, you can screw it direct on to the hydrants, and then there is a means in the thing itself of opening it; it is not like Bateman's.

3552. In screwing it down, can you open the valve?—No; you screw it on, and then you have another spindle by which you can open the valve.

3553. Is that spindle in the box?—Yes, down below in the fixture; I have two or three drawings here.

3554. Will you show us the drawings?—That (*producing a drawing*) is another sort of hydrant, there are a great variety of them; this is a socket into which the pipe from the main comes, it comes in there.

3555. Where is the pavement?—The pavement is up here (*pointing to the drawing*); there is the pipe from the main, this is put into a brick tank or box; there is the box over it, and the pavement is made good up to here; this is shown fixed on, but when the whole thing is not being used, this comes on there (*pointing to the drawing*).

3556. You have to use an intermediate stand pipe?—Yes, if you brought this up to the pavement you might screw this direct on; but there is an objection to that, because the hose always chinks on going over.

3557. There is a key there?—Yes, which the police keep.

3558. Mr. *Benyon.*] What is the cost of that?—These cost, including the branch to the main, the cutting of the main, and the putting the branch on, about 3 *l.* 10 *s.* each. In many cases in London you would require to have much larger ones than that, because now they have those steam fire engines which would use a great deal more water. I think the best would be the common sluice cock and a simple branch with a screw to it. You could put that in either four or five, or six inches, as the case may be.

3559. What is the diameter of yours?—Three inches.

3560. *Chairman.*] There is also the relaying of the pavement as an item of expense?—I think probably I have understated it for London; 4 *l.* would be about the cost.

3561. For the whole, including the relaying of the road and pavement?—Yes; it is a special case in London. I know they charge very highly for that.

3562. Mr. *Benyon.*] That is independent of the stand pipe, of course?—Yes, they carry that with them.

3563. The stand pipes would cost about 30 *s.*, would they not?—They cost more; sometimes as much as 3 *l.*; it depends upon the length of them, and the copper holes and so on; that is a fire brigade question, or a matter for the police.

3564. *Chairman.*] Did you give us the expense of merely having a branch, using the sluice cock to put the water on?—In the way that I last suggested it would be more expensive. A three-inch one would cost probably from 5 *l.* 10 *s.* to 6 *l.*, and therefore it is only in the larger cases that I would put that. We have put some round Buckingham Palace, supplied with water from the Serpentine, with very large pipes; and there we are able to put on a steam fire engine, capable of throwing 500 gallons a minute. We have put four or five of them round the Palace, and some here also. We have got those large ones round the Houses of Parliament.

3565. What would be the cheapest apparatus?—The very cheapest way in which you could go to work to let the water out of the mains in London, would be either to attach Bateman's, or somebody else's, apparatus direct on to the plug which now stands up in the street. I dare say that that could be done, including the box, for 25 *s.* very likely.

3566. The plug standing down in the street, you mean?—I should have said the plug which stands up from the main towards the street, and Bateman's apparatus, for instance, might be put on to the top of this plug, and I dare say the whole expense would not exceed certainly 25 *s.*

3567. That would be interposed between the pipe and the surface of the street, in a box?—Yes; my objection to that is, that in London the traffic is so enormous that the box would not stand any great length of time, I suppose.

3568. That would depend upon how strong it was, would it not?—Yes.

3569. Upon the goodness of the iron of which it was made?—Yes.

3570. If the iron was annealed I suppose that there would be very little chance of its breaking?—I should not like to keep it in order myself; it might be annealed; you might use three-inch cast iron, and that very likely would last a very long time.

3571. Colonel *Hogg.*] You would prefer that it should be put in the pavement?—I should, for this reason, that it is not only out of the way of the carriages, but that you can see it in a moment, whereas in the middle of the street it is liable to be covered up by dirt.

3572. *Chairman.*] Unless you have an indicator?—Even then it is astonishing how difficult it is to find it in the middle of the street. I happened to be at a recent fire, Rennie's fire, before the fire engines were there; it was a frosty night, and there were two or three inches of ice and snow frozen on the surface of the street; the cock happened to be at the end of the street, and there were marks stuck up against three different places saying "F. P. (I think it was) so many feet," and yet I could not find it; I had a man there, and dug about whilst they were fetching the fire engines; we could not find the plug for ever so long, and at last we had to break the main.

3573. It is easy to put an indication on the pavement, is it not?—It could be done, no doubt, but that has the objection of being liable to get covered up sometimes; it is difficult to have an apparatus ready to measure 20 feet or so.

3574. How much water would that cheap one cost?—You might get very well from

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from any one of those fire-plugs, I should think, a jet equal to say from 60 to 80 gallons a minute.

3575. Have the Metropolitan Board consulted you upon these matters?—Not about the fire supply.

3576. About the fire-plugs?—No, not at all.

3577. Mr. *Cripps.*] Your experience, generally, in the water supply, and the water question, is not confined, I believe, to England; you have had experience abroad as well?—We have been engaged in the supply of one or two places abroad, especially lately. We have been supplying a portion of a town in France. We have been doing the work as contractors for it; the town was Rouen; it is a large place, and it is just laid on now. I know something, necessarily, from having had to inquire into it about the general way in which towns are supplied in France.

3578. Is that a constant supply laid on there?—Yes, that is obliged to be constant.

Cross-examined by Mr. *Denison.*

3579. Rouen we cannot go into, because I know nothing about it. To begin at the end about these fires; you say that the Metropolitan Board have not consulted you?—They have not.

3580. And if they did, I suppose you would recommend what you are recommending now?—In all probability.

3581. Have you made any estimate of what, in your opinion, it would cost to do the fire business of London completely, according to your views; and, if so, will you give us that estimate?—I am not able to give it you; I have not made one.

3582. You did make one once; I have something of the kind here?—I think you are mistaking the gentleman.

3583. Perhaps it was your father or your brother?—It was my father; he was asked by Mr. Thomson Hankey to give evidence before the Metropolitan Fire Committee.

3584. Do you know the evidence he did give then?—I do.

3585. How much was the figure?—That was, I think I may say, to include a very great many works; it was to cost 3,000,000 *l.*

3586. It was to do the fire business of London?—Yes, thoroughly; it would have been a very efficient and thorough system; it was mentioned in the report of the Committee; it was talked of also by Mr. Quick. There was a separate system of reservoirs and fire-mains altogether, so that the full pressure of the reservoir should always be on the mains.

3587. It was very much in fact what Captain Shaw wants?—No, Captain Shaw does not go far enough.

3588. Just trump him, will you; I should like to hear that?—No, that plan of my father's would not cost more than Captain Shaw's; it is a very good and efficient apparatus which he proposes, but there are too many details about the fire apparatus itself; it is an expensive apparatus.

3589. In fact if that were adopted it would cost more than the 3,000,000 *l.*?—No, not more than 3,000,000 *l.* I think it would cost about the same; but then it would not be so good as my father's, inasmuch as he would not have the reservoirs.

3590. Now about the clauses in your Brighton Act you told us of; I cannot see what your Penalty Clause, 4, in your Brighton Act corresponds to in the London one?—I think it is Clause 24, if my memory serves me.

3591. "No person shall make or lay down, or permit to be made or laid down, any pipe or other means or contrivance for taking, using, or obtaining water to communicate with any pipe or apparatus connected with any of the mains or pipes of any company without giving such notice, and except under such superintendence and according to such direction as is provided by 'The Waterworks Clauses Act, 1847.'" That does not do the whole of yours, I think?—I think the clause was altered when the Bill was drawn.

3592. Yours seems to me, unless there is something that I have not noticed in the metropolitan one, a stronger clause than the metropolitan one, a good deal; I do not find the 5 *l.* penalty in connection with these things in the Metropolitan Act;

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Act; do you remember whether it is in?—I was under the impression it was in. I will not be certain about it.

3593. It is not in Clause 24, at any rate; I see there is the power of cutting off the water?—It is not in Clause 24, certainly.

The *Chairman* inquired what the provisions of the Metropolitan Act were, with respect to the bye-laws.

Mr. *Cripps* stated that under the Metropolitan Act there was no penalty, as such, recoverable before justices.

3594. Mr. *Denison.*] At Brighton, I think you say, you have duplicate mains laid all over?—We have.

3595. Would you recommend that in London?—No, I should not think it was necessary if time is given to make the necessary alterations in the fittings.

3596. As to the necessary alterations in the fittings, you say fairly that you do not know exactly what the general communication pipes are; but you tell us about Cubitt's pipes; we have always understood that Cubitt's houses are better built than most people's, are they not?—I believe they are very well built.

3597. Have you any means, either from knowing what sort of pipes people buy of you, or otherwise, of telling us what the usual sort of pipes are in the poorer houses?—I cannot tell you where the pipes go to, but I can tell you that we supply three or four large general dealers in lead pipes, too.

3598. Mr. *Cripps.*] Are those in London?—Yes, they take just about the same kind as Cubitt's.

3599. Mr. *Denison.*] When you say dealers do you mean builders?—No, the dealers who supply the plumbers, and we supply two or three other builders also.

3600. I quite understand that in Brighton the people have to do all these things, putting the fittings in order, and keeping them in order?—Entirely so.

3601. Mr. *Benyon.*] Or do you do it and charge them for it?—We have the power to do it, if after three days' notice they do not put it in order.

3602. But they do not employ you in the first instance?—No, the company might do it if they chose, but they never have taken that position.

3603. Practically it is not so?—Practically it is not so.

3604. Mr. *Denison.*] If you do it, from whom do you recover the expense?—From the landlord in poorer houses, and from the occupier, of course, in the others.

3605. *Chairman.*] Is there a provision in the Act, that you may sue either the one or the other?—Yes, it says the owner or the occupier.

3606. Mr. *Denison.*] I think I understood that 1857 is the date of your last Act?—I do not think that is our last Act; we have had some Acts for works since; it is the last Act about this.

3607. You say that in Brighton you have no difficulty in seeing the taps in the poorer houses, the people do not object to your coming; the landlords, I suppose, have to pay for putting things in order?—Yes.

3608. Is all your water pumped, or is any of it supplied by gravitation?—It is all pumped; it is pumped up from wells in the chalk, first of all, into reservoirs; we pump it on the average to 250 or 260 feet high.

3609. I see by this table of yours that in one description of house where they use 21·7 gallons a head, they have some very odd kind of fittings; it is described as fitted with "wasteful servants"?—I have no doubt it is "wasteful servants."

3610. This says "fitted with wasteful servants, and Hodder's water-closets"?—I have no doubt it is.

3611. That is not at all an uncommon kind of fitting, is it?—No, it is a very usual kind of fitting.

3612. Can you explain how it is that these Washington-street people use so very little as 3·6 gallons a head?—I cannot explain it, except that the fittings are only just done, they are in very good order.

3613. But, of course, with the best of fittings, 3·6 would be a very small quantity a head?—I can only say that that is what it is; I think I have something that will show what we are using at my own house, without baths or anything of that kind.

3614. How much is it?—It will not do, I am afraid, because I have a boiler, a small cooking boiler, and use a small quantity for cooking and that sort of thing, *Mr. E. Easton.*

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thing, but we use about half, as nearly as possible, for drinking, cooking, and washing up down stairs.

3615. Is that half of the 11 gallons you spoke of?—Yes, and the rest is for water-closets and baths.

3616. I have your table here of constant and intermittent services at Brighton; do you know how many houses have been changed from the intermittent to the constant system?—No, I have not that, or I should have put it upon the table; but I think that not more than probably 200 altogether have been changed from the intermittent to the constant.

3617. Do you mean in the whole of those four years?—In the whole of the five years.

3618. From 1863 to 1866, I see the quantity taken seems gradually to have been creeping up; the figures are 87, 90, 91, and 98?—Yes.

3619. How is that accounted for?—The only way in which I can account for it is, that the inspection is not so good, that, in fact, it is getting beyond the one inspector to do the work.

3620. When he was a new broom he swept cleaner, perhaps?—There may be something in that also; I should recommend the directors immediately to put on another, and if that is done, no doubt we can reduce it back again to what it was before.

3621. Your experience, like Mr. Bateman's, and everybody else's, is that you are obliged to keep up the inspections pretty close, or else they soon get ahead of you?—Yes, certainly; we should be like Glasgow very soon.

3622. Will you give us a little description of the meters you spoke of; you applied a test of meters in some streets, I think, did you not?—Yes; the meters that we have used here are the meters I have used in a great many places, Siemen's, Messrs. Guest & Chrimes supply them; they are new ones.

3623. Are they the same that Mr. Simpson spoke of?—I dare say they are; I was not aware of it.

3624. First of all, how did you use them; how many houses was each meter put to?—The number that is put upon that paper; it says one meter to each street.

3625. You are referring to a different paper now, I think?—It is No. 3; all those things are taken by the meters.

3626. You mean that a meter covers all the houses you spoke of?—Yes; it registers all the water that passes from the main, whether it leaks in the service pipes, or wherever it goes.

3627. What class of meter, according to Guest & Chrimes' Table would that be, do you know?—I think they were inch meters for the small streets; it was an inch meter for Washington-street, for instance; the inspector says it was two inches. There were 3-inch meters used, I know, as well as 2-inch; a 3-inch meter was used at the Park-crescent.

3628. And the number of houses in Washington-street you covered was 90?—Yes.

3629. And in New England another street, 124 houses, and so on?—Yes.

3630. To be quite sure that we agree about this, you do not apply the meters to a single house, do you?—I have not in those tests; they are simply meters put to each one of those streets in the branch pipe from the main.

Re-examined by Mr. *Cripps*.

3631. The duplicate system that you have in Brighton simply arises from the Constance Service Company having purchased the waterworks?—Precisely.

3632. It is merely an accident?—It arose entirely from that; we should have supplied on the constant service principle if we had gone on with the first Act, and put on new fittings.

3633. You did not talk of that as a system to adopt or begin upon, but it was merely an accident that at Brighton it was so?—Yes, it was so; we were bound to give a constant service immediately to everybody in the town, and we had no time to do it; we found that the waste was so much when we laid the water on; we laid out 17,000 *l.* or 18,000 *l.* upon those pipes.

3634. With reference to the pipes that you have supplied, I do not understand that Mr. Cubitt is the only builder you supply?—There are a great many others whom we supply; these 400 tons yearly, that is equal to 86 miles of pipes, go to several persons.

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3635. That is supplied annually?—Yes; about 46 miles of that goes to London, and is used in London, I have no doubt.

3636. So far as you speak of that, wherever it is used, in your opinion those pipes would not require renewal if there was constant pressure?—Certainly not.

3637. What is paid at Brighton, as to the price of water, for watering the streets?—I think it is 5 *d.* per 1,000 gallons; we had a great dispute with the town authorities; we used to charge 11 *l.* 10 *s.* per acre watered, and we thought they used too much water; there was a constant dispute, and at last they said they would take it by meter, and then, after our deputation from the Board had gone to a great number of towns, they proposed, first of all, to give us only 3 *d.*, I think, and then 4 *d.*; we stood out for 6 *d.*, and at last got 5 *d.*, rather than go to arbitration, and that is now being paid for watering the streets in Brighton.

3638. *Chairman.*] Do we understand that you thought it better to lay down a double set of pipes in Brighton rather than give a constant supply through the pipes which had been laid down for the intermittent supply service?—Yes, precisely; in fact, we found it was impossible, with the works in the state in which the old company had left them, for us to supply a proper quantity of water; the engines were not equal to pumping the extra amount which would have been necessary to meet the waste in the intermittent service pipes.

3639. You mean that if you had used the intermittent service pipes for a constant supply, the waste would have been so great that you would not have been able to supply the quantity?—Precisely; we tried the experiment; we turned the water on one Monday morning, and again on the following Monday morning; the first time we did it on the intermittent system in the usual way, and we found that the quantity consumed, that is to say all that went out of the reservoir, was between 90 and 100 gallons per head; on the following Monday, when we did it on the constant system, the quantity consumed was 177 gallons per head, or nearly double; and that we had not the means of supplying.

3640. On converting the intermittent service into a constant service, there was this enormous difference?—Yes.

3641. You used exactly the same pressure, and everything on the two Mondays?—Yes; the first Monday was the time when we tried the intermittent system; and the quantity consumed on the following Monday, when we tried the constant system was about double.

3642. Then why did you not attempt to examine the state of affairs in the houses, and prepare the people for using the existing pipes for the constant supply?—Because we found a great objection on the part of the landlords to do anything towards altering the fittings; they were satisfied in the better class of houses with the service, upon the intermittent system.

3643. Then you had got yourself into the dilemma, that if any individual asked for a constant service, he was entitled to have it, although his next door neighbour declined to have it?—Yes.

3644. Which was an impossibility?—Yes.

3645. To get yourselves out of that difficulty, you had to have a double service?—Precisely.

3646. You stated that you had several zones to meet the different elevations in Brighton?—Yes.

3647. Were all those zones established before the constant system was introduced?—No; when we bought the works of the old company, we built one reservoir only with a stand-pipe; that is to say, the reservoir supplied a certain proportion of Brighton, about five-sixths; and then there was a stand-pipe, over which they forced the water for the supply of the other sixth; in our first Act of Parliament which we got, enabling us to purchase the old works, we provided for putting immediately to other service cisterns or reservoirs, one at a height halfway between their reservoir and the sea, and the other one about 30 or 40 feet above the top of their stand pipe.

3648. So that you made the one large zone and one little zone, into how many?—Into three; since then they have began to build up by the racecourse; the workhouse has gone up to near the grand stand, and to meet that, we have now a reservoir 480 feet above the sea, that will make a fourth zone.

3649. To command the upper level?—Yes.

3650. What

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3650. What expense was incurred in putting up the the intermediate reservoir, and introducing the intermediate zone?—I think the amount expended under that Act of Parliament was 30,000 *l.*

3651. What did you do for that?—For that we put up those two reservoirs, and a large engine, and a new engine-house; and we also laid a main straight from the engine-house to each of those reservoirs; and we put also delivery mains from the reservoirs to join the other mains, which there were already, and cocks at different points where we desired to cut off the water.

3652. To make a zone?—Yes; Brighton being very eligibly situated for that.

3653. What sort of reservoir did you construct?—We constructed a covered brick reservoir.

3654. Containing how much?—Containing a million gallons low service, and half a million gallons high service.

3655. How big was it?—I can very soon calculate that; about a third of an acre I make it.

3656. What was the necessity for making the reservoir so large?—In order to save our pumping in the night, and to have a certain storeage, because we did not wish to work the engines day and night, as they do in London; we have a storeage of about two-and-a-half or three days' supply for Brighton all over.

3657. Would it have been practicable to adjust the difference of the zones without a large reservoir, by a small regulating reservoir?—Yes; and we could have done it without any reservoir at all.

3658. I mean with a large cistern?—Without any cistern we could have done it in this way; each of our large engines pumps each of the services at the same moment; that is to say, we have one set of pumps running into the low service, a second into the middle, and a third into what used to be the high, and now the fourth into the highest, and they are all worked at the same moment by the engines; therefore, if we had no reservoirs at all, and pumped direct into the main, we should supply our zones as we do our reservoirs.

3659. That would be having a separate pump to each zone?—Yes, as it is; in fact, at Brighton we could do that now; we could shut all our reservoirs, and yet supply the town without any reservoirs at all to-morrow.

3660. If the company have several pumps in their pumping establishments, they have only to connect each zone with a pump, and so they can regulate the head of water in each zone?—They could do so, but it would, in the case of London, cause an enormous expense, because you would have to carry your pipes from the pumping station a long way off to the different levels; and have each separate pipe connected with a separate pump going to the particular zone that you wished to put it under.

3661. Do you think it would be possible to introduce small reservoirs to regulate the different zones upon the London system without there being large reservoirs?—In order to break the pressure.

3662. Yes, if the head be too great, I mean?—I think an apparatus might very easily be designed; in fact, I think I know of one which, at a very moderate cost, would alter the pressure to anything you liked, either in the main or the service pipe.

3663. What would be the cost of that apparatus?—I cannot say; it is done in two or three waterworks on a large scale; I think, if I remember rightly, it is done at Manchester.

3664. Is it an affair of hundreds or thousands of pounds, or what?—If you take a three quarter-inch pipe as being the lowest or a half-inch pipe, I dare say it could be made for a few shillings.

3665. A 36-inch pipe?—That would cost 2,000 *l.*, 3,000 *l.*, or 4,000 *l.*, because it would have to be a very strong and elaborate thing; but I am speaking rather out of book; I do not quite know about it.

3666. Have you made any experiments to know how high the water can be thrown with any given head of water in the reservoir from the plugs?—We have made them at different places, but I have not made any at Brighton, not in the town.

3667. After the water has gone through a considerable amount of piping in the town, can you have any knowledge of the extent to which the water can be thrown from the plugs or hydrants?—I can only say generally that we have always found that there is pressure sufficient to throw it on to the top of a house without any additional pressure.

3668. With what average pressure?—We arrange it in this way; each of the zones is immediately capable of being connected with the one above it, and if we found that we had not pressure enough in the higher parts of the zone to throw a jet to the top of the house in the lower zone, we should throw it into the middle; we should connect it.

3669. You mean, that if you had not enough pressure at a point in one zone you would throw it into the zone above so as to get the pressure of that zone?—Yes, and also the contents of the reservoir of that zone.

3670. Mr. *Benyon.*] Do you use your whole steam power every day?—Not the whole of it, we have a duplicate engine at the works.

3671. Therefore, in case of one of the engines wanting repair, you could repair that engine without interfering with your supply?—Certainly.

3672. Of course if a main requires repair, you must shut off the supply?—Of course.

3673. And during that period, your consumers would be without water; I mean on the constant system?—Yes, certainly they must be for that time; that is one of my reasons for wanting cisterns. In the better class of houses there must be cisterns.

3674. And of couse it must necessarily be the case that repairs will be required in the mains?—Occasionally; it is rather a rare circumstance in the waterworks that a large main is out of repair.

3675. Lord *Frederick Cavendish.*] If the London Water Companies were required to afford a constant service, would it, in your opinion, be necessary for them to do as you have done at Brighton, that is, to provide a duplicate system of mains?—No, I think not.

3676. What is the difference between the two cases?—I think a better method altogether might be devised of supplying the houses in London with water; a better system might be adopted to prevent waste. It is rather going into a new thing altogether, but I should propose certainly to supply a constant service by meter. I see no difficulty in it at all; when I say no difficulty, of course there would be a certain amount of difficulty, but not an insuperable difficulty. I think it could be so designed to be supplied by meter with perfect fairness to the Water Companies and to the consumers, by making certain arrangements; and the general principle upon which I would propose that that should be done would be this: that there should be a sliding scale adopted to the class of house; each house should have a certain amount of water allotted to it, just in the same way as I allotted 25 gallons to a room just now. I would take a 100 *l.* house, and allot perhaps 150 gallons of water per day, and to a 200 *l.* house I would allot 300 gallons per day, and so on, upwards and downwards, provided that no house should have less than 50 gallons. Let the companies charge the same rate as they do now for that minimum quantity of water, and if more is consumed, or passes through the meter, the consumer should have to pay for that additional quantity.

3677. Then you would have to provide a meter for each house?—Yes, there must be a meter for each house; it involves a separate supply pipe.

3678. For how low a class of house could you provide separate supply pipes?—Every house in London does not pay the water rate; it is difficult to say for what house it will be provided; some of the low class of houses pay a rent of 60 *l.* or 70 *l.*, because of several families living in them.

3679. It would not be difficult to arrange for providing it, would it?—I have not gone into that question; I think it would pay the companies very well to do it because it would save the water.

3680. *Chairman.*] What would be the expense of the meter you propose to use?—I do not say that this is the best for the purpose, but I take it for an example; I think a much better meter could be devised, and would be devised if a greater number were wanted, but in the case of a 100 *l.* house, it would be a three-eighths meter, which passes 150 gallons per hour, under a 50 feet head, and you could fix that to any service pipe for 45 *s.* inside the house, that is to say, that would be the cost of it fixed; the price put down in this list is 54 *s.*, but then there is a discount off to the trade, and of course the Water Company in such a case as that, would get it as cheap as anybody; they would get it at 45 *s.*

3681. The cost to the public would be 54 *s.*?—If the public did it, but if the Water Company did it and charged 10 per cent., because they would have to be

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be paid for their outlay, that would add a certain amount to the water rate, but not much.

3682. That would be a million of money to be spent in London?—I dare say it would be 800,000 *l.* or 900,000 *l.*, but it would save an enormous quantity of water, as under that system everyone would have a minimum quantity of water, and he could not get more without paying for it.

3683. Lord *Frederick Cavendish.*] It would save the Water Company an enormous sum of money, but it would put the cost of the saving upon the consumer, would it not?—Yes.

3684. Would not the consumer complain?—He would have to pay the 10 per cent. upon the 45*s.*; that is a way in which it could be done by meter; that, however, is only a suggestion.

3685. Anyhow, in making the change from the intermittent system to the constant system, would you not have great difficulty to overcome, because the fittings adapted for one system are not adapted for the other?—Certainly; that is the great difficulty.

3686. You think that it could somehow or other be overcome without applying a separate system of mains?—I think so, by inspection; by having a proper number of inspectors.

3687. But it is a question of an immediate change; it seems to me that the difficulty is for the first week or month?—It would be very difficult indeed at first; it is a matter of miles; a certain time would have to be given, and if it is made compulsory upon the Water Companies to give, it must be made compulsory upon everybody to take it; that ought to be done by legislation, and then a certain time ought to be given for the alteration of fittings; it ought not to be left to the Water Companies, but they ought to be compelled by a clause in a general Act of Parliament.

3688. *Chairman.*] You presume that the change would be made in sections in London taking the district mains one after the other?—Yes, no doubt, as fast as possible.

[The Witness withdrew.

The *Chairman* stated that the better course with regard to the local Acts would be to print anything peculiar there might be in their provisions in a paper, which might be put in the Appendix.

Robert Rawlinson, Esq., C. B., Examined by Mr. *Wilkinson.*

R. Rawlinson, Esq., C.E.

3689. I BELIEVE you are an Engineer, having very great experience in all that relates to water supply?—Yes.

3690. You are also, I believe, chairman of the Rivers Pollution Commission?—I am.

3691. As an engineer, I believe you have been employed in carrying out systems of water supply to many towns?—As Government inspector, I have inspected most of the water supply districts of England; and as a private engineer, I have devised and carried out works in Berwick-upon-Tweed, in Alnwich, in Morpeth, in Penrith, in Ormskirk, in Worthing, in Wigan, in Swansea, in Lancaster, in Keswick, and in some other places.

3692. Have those systems been upon the constant supply, or the intermittent system?—Constant in all cases.

3693. Then your experience, therefore, has been of the construction of systems of water supply upon the constant system from the first, and not the change from an intermittent to a constant supply?—No; not in my own case.

3694. Of course, so far as your official investigations are concerned, these investigations are extended not only into original constant supplies, but any changes from the intermittent to the constant?—Just so.

3695. Will you be so kind as to state to the Committee your opinion with regard to the advantage or disadvantage of a constant supply, as compared with an intermittent supply?—I think the advantages of a constant supply, where the mains are properly devised and laid, and properly superintended, may be stated briefly, thus: First of all you have the water in its original state of purity delivered within each tenement; you have, if the apparatus is properly supervised, a minimum of waste, and you have a maximum of efficiency, and consequently you get all the advantages that a good and well regulated water supply can give. The disadvantages of an intermittent supply are notorious in this metropolis; they are well known. In the better class districts the waste of water is enormous; in the poorer class districts the waste is also very great; and there is one general prevailing water famine. The water that the poor people get is contaminated as far as water can be contaminated, where it is stored in the immediate vicinity of their dwelling houses, and especially where it is stored in receptacles placed close alongside privies, or water-closets, or dust bins, as it is in very many cases.

3696. The advantage being evident of the constant supply over the intermittent, have you directed your attention to the difficulties with which the application of the constant system to the metropolis appears to be attended?—The difficulties with regard to the change from the intermittent to the constant system in the metropolis would involve, in my opinion, a re-arrangement of the principal mains and subsidiary mains to a very great extent. The metropolitan water supply has grown up gradually, and is not the result of an originally well-conceived plan. There are many anomalies in the existing supplies; the pipes in many instances are what we term wiredrawn; that is, although there is a pressure in the mains in London, active for wear or for mischief, equivalent to 150 or 200 feet, there is not a pressure for fire service of 10 feet. That entirely arises from the wire drawing of the mains; that is to say, the friction of the water as it goes in being forced along the mains causes head to be lost, so that when a plug is drawn, or when vent is given sufficient to let the water escape from the system of mains. Now, if the Metropolitan Water Companies had their mains broken up into sections, and had them supplied from central points radiating away to the branches, they could have an efficient and living supply from which they could give a much better and constant supply than they could now.

3697. Then that would be one consideration; the relaying of the mains of the different Water Companies, or their rearrangement?—Not the relaying, but the rearranging, in some respects, of the mains.

3698. *Chairman.*] Is that answer the result of any practical experiments you have made upon the pipes in London as to the head of water being only 10 feet at the plug?—I can say this; take Parliament-street for instance; I have known a fire-plug blown out over the tops of the houses, and the moment that the water had expended itself by the first gush, it did not rise more than 12 inches over the pavement. I have also seen, over and over again, when a fire-plug has been drawn to insert a stand pipe, that the water merely bubbles over the surface. I know, by my own knowledge, that the pressure generally at the head is from 150 to 200 feet. I have had no opportunity of making any experiments or carrying out any change in the metropolis water supplies; but in my own services, which I have laid down, in Wigan for instance, the service in the mains will not only throw the water over any house in the town, but into and over any of the mills of five or six stories high without the intervention of a fire engine.

3699. With what head of water?—One hundred and fifty feet.

3700. Mr. *Wilkinson.*] Am I to understand you, that such an effect might be obtained in London, in your judgment, by a judicious rearrangement of the mains, of the water companies supplying London?—I am perfectly satisfied of that.

3701. Have you directed your attention to the increased supervision which the change in the system would require to prevent waste?—I can hardly say that an increased supervision would be necessary over the constant, compared with the intermittent system; I cannot speak definitely or exactly on that point; I am only speaking from a general knowledge, and judging from general facts; but my own impression is, that, with the intermittent system now existing in London, a moiety of all the water pumped and passed into London is actually wasted; that is my opinion.

3702. Under the present system?—Yes.

3703. Is that for want of competent supervision?—That, in my opinion, is in a great measure arising from the want of competent supervision. I will take the district that I live in. I have been living since 1848 in the neighbourhood of Brompton and Kensington. There are mains passing along there, and there are stand pipes and hydrants with valves at the surface; and never, so far as my knowledge goes, have those mains and services ever been tight since the

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the first day I came into London. I have often seen for weeks and months streams of water running along the gutters that would have supplied a considerable village. I think that is a sort of neglect which ought not to be allowed, because it represents coals, and steam power, and money value. Then with regard to the constant supply, it would be in vain to expect that any moderate volume of water would supply a town if it is left hap-hazard. If there is no thought nor care for those services, they get out of order, they wear, they are broken, and are abused. I will admit they require constant and unceasing attention. But the repair of a cottage service may be made so simple and so easy, that an ordinary workman may take a dozen or two of sound taps in his pocket, or in a small bag, and may go from house to house and just ask to look at the service; there is nothing inquisitorial arising out of it, he need create no nuisance, but if the service is as it ought to be, within the four walls of the dwelling, and there is leakage or waste, the tenants would only be too glad of his visit; and if he does not visit them, they will cry out loud enough about it; he goes in, turns the tap that shuts off the service from the main, screws it down; he takes out of his bag a tap of exactly the same size as the one that has failed, he unscrews the tap that is attached to the service, and screws the other on, putting the damaged tap into his pocket, and taking it away with him; those taps ought to be of such a construction, that the same workman when he gets home, can take them to pieces; it is generally a small portion of the leather that has got cut or is out of order, he releathers the tap, and then it is fit to go back again when he makes the next visit.

3704. *Chairman.*] Do you know, so far as your knowledge extends, whether there are taps of that kind upon the communication pipes in London?—I do not know; I only know in my own experience, that where a tap can be bought for about 1 *s.* 3 *d.*, I insist upon a small stop tap being put on, intervening between the main and the house supply.

3705. As far as your general observation has gone in the matter, do you know whether that is usual in London?—I do not.

3706. Mr. *Wilkinson.*] You speak from experience of towns that you have yourself supplied?—Yes; then as to the first cost of a service of that class, taken within the walls of a tenement, I will make this remark; supposing it should be decided that there shall be what is termed a constant service in the east, or poor end of London, if that constant service means a stand-pipe in the court or yard, I can only predict that that will end in disappoinment, and in a continual waste of water; I have seen scores of stand-pipes, and I can safely say that I never saw a moiety of them that were sound and in working order; children get playing with them, they are the property of no person, and are accessible to people from all sides of the place; they get broken and abused, and get out of order; they are not a nuisance to any special person, and, therefore, the people do not care whether they are repaired or not.

3707. *Chairman.*] That system leaves the people to store the water in their room in jugs, and pitchers, and pails, and so forth?—It compels the persons living in those courts, to take an independent supply in jugs, and jars, and pails, storing in that manner in their own houses, whereas, by having an independent supply in their own houses, that would be avoided.

3708. Perhaps you would tell us what you propose to do, changing from the present state of things to the state of constant supply?—There must be in that case an independent service carried into the house instead of that stand-pipe, which should be removed.

3709. Will you explain; what do you propose to do in making the change in London from an intermittent supply to a constant supply?—I would take small service-pipes into each of the tenements. London is essentially a water-closet city; all classes of the population use the soil-pan or water-closet, and as that soil-pan or water-closet has been introduced effectually and used, we have had a gradual reduction of mortality in the metropolis, and a gradual improvement in cleanliness and health. It may be necessary to bring into play in London a system of separate cistern arrangements, that is to say, a small cistern holding from 50 to 100 gallons, which shall be connected with the main, and which shall not be capable of being tampered with, out of which each tenement can draw its supply without having the power of wasting more than its own small service contains.

3710. How would you do that?—That can be done in several ways. There is one

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one way, which I suppose is hundreds of years old. When I was in Constantinople I looked over the mode of service there, and there is a method there of supplying from their great acqueducts and fountains, which for that purpose, namely, for preventing any individual wasting more than his appropriate share of water, is most admirable. If you can imagine this table here divided up into a multitude of squares, such square need not be much larger than this inkstand, a service goes out of each square, and each square is supplied by the water flowing over the whole; but if that tap is left open, it cannot empty any other square; it can only empty its own little square; therefore the individual as long as he is moderate in his supply, and is taking a just demand, gets his supply. The moment his tap gets out of order, he can only waste that belonging to him; he cannot waste the whole. That was adopted, no doubt, because they had very rude ways of forming supply pipes. The larger supply pipes were made of rapped lead, rolled round and soldered; and I expect they could not very easily make junctions that were serviceable, and so they adopted this method of drawing independent supplies to the places from those small fountains.

3711. Is that a plan that you would propose to adopt for London?—No; because we could have other methods here.

3712. What plan would you propose to use in connection with the large cisterns which you have described, to give a supply to each separate house?—I do not know that any better or different plan can be adopted to that which has been found practicable in other places, that is, by taking a small pipe and giving an independent supply to each tenement from the main or from the submain.

3713. I must ask you to follow out your proposition of a 50-gallon cistern; first let us get one point clear?—During my recent inspection of the present mode of supply in the east of London, I found that in some courts there was an inch-pipe with a swan neck at the end of the court, and no sort of tap upon it. It is left open there all the year round. The supply is turned on from 30 to 90 minutes in the 24 hours, on six days in the week. Now this inch-pipe delivers its water by the swan neck at all such times as it is turned on. If the poor people are there ready with their pans and buckets to catch it, they take what it gives; if they are not, it wastes. Now it occurred to me that, supposing the Water Companies even with their present intermittent method had power to erect a small service tank or to compel the landlord or the owner to do so, or to treat with the townships, or parishes, or local authorities to erect a small service tank which should be supplied by that same inch-pipe, and from that small tank each individual should have a supply taken into his tenement; the cost would not be very great, the service would be practically constant, and there would not be that great waste of water which there is now, and that great inconvenience.

3714. What is to be done in the tenement to prevent waste there; because if one person were careless he would draw off the 50-gallon tank, and leave everybody without any water?—I think not.

3715. It would be simply a matter of fact, would not it, that if he were careless and drew off the water, nobody would have any?—It might be so in one or two cases, but where a service is taken within the walls of a tenement, and is placed there, there is not that disposition to waste.

3716. How would you prevent the tenant from drawing off the water from the tank?—I do not know that I could prevent him; each person must have the command of his own service.

3717. Would you give him an unlimited command over the whole tank?—Yes.

3718. Over the whole contents?—Yes, just as I have in my own household, an unlimited command over my own tank.

3719. Then we should not be so advanced as they are at Constatinople if that were the case; what we want is, to find out how the individual in the house is to be prevented from misusing the water supply?—There have been service boxes of different kinds invented and patented, called "water waste preventers;" but I do not know of a single one that answers its purpose, and that does not become utlimately a nuisance.

3720. Does nothing suggest itself to your mind to prevent the occupant of a house from misusing the supply of water that is given into the house?—No; you would then put the poor tenant exactly upon the same conditions that you put the

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the rich tenant; where there is a service pipe placed in the house, instead of having a service cistern in each house, you would have a service cistern for a group of small houses.

3721. The difficulty would seem to be this, that if every man has got his own cistern, every man suffers the consequences of his own misconduct; but if there is one cistern for 50 houses, everybody would suffer for the misconduct of one?—I think you would find that that would very soon regulate itself, if it were known that any individual in a house was systematically wasting the water.

3722. They would ratten him?—I think they would.

3723. Do you think that that would be very desirable?—I do not think it would. I find that when means are given to people for their own comfort and convenience, after the newness has worn off, the thing works better. I always find that when a change by new apparatus is brought into use for the first two or three months, it is much more liable to misuse and abuse, and much more liable to be thrown out of order than it is afterwards. When the newness has worn off, when the advantage has become apparent, the abuse ceases, and the proper use is looked at. I have found it over and over again that where we have converted privies into water-closets for the first three or four months, there is an everlasting waste and abuse of the water, the taps are left running, and the closets are put out of order by improper things being put in; and if one was to listen for six months to the general outcry, one would come to the conclusion that the whole was radically wrong, and must be taken up; but let the novelty wear itself out, and give it proper supervision and proper attention; get the thing right, and let the newness wear away, and my experience is that the abuse ceases.

3724. Mr. *Wilkinson.*] As I understand, you have been rather describing evils that now attend the present intermittent system, have you not?—The intermittent system has evils, for instance where there are ball-cock services.

> *Chairman.*] I do not think you need pursue the inquiry as to whether the constant supply is a benefit or not; the water companies are bound to give a constant supply; the question is how are they to do that; anything that will throw light upon that matter is very important for the consideration of the Committee.
>
> Mr. *Wilkinson.*] I understood that the suggestions were, rather suggestions with reference to the intermittent system and the use of a cistern connected with the use of that system.
>
> *Chairman.*] The Committee of 1862, decided that there ought to be provisions made by the Water Companies for constant supply within five years; the five years have elapsed, and therefore it must be assumed that they are in a condition to give a constant supply; the question is, how they are to do that; that is the point upon which we are to take evidence; it is evidence of fact, not of an Act of Parliament.

3725-8. Mr. *Wilkinson.*] I understand you to say, that so far as regards the supply, especially to the poor, however poor the tenement, it is in your judgment essential that the service should be within the four walls of the tenement?—If it is only a single room, I should have its supply within its four walls.

3729. Does your experience confirm what has been stated by others, that the chief source of waste is the improper use of the water-closets?—Yes; and the improper apparatus put to the water-closets.

3730. I was going to call your attention to that; having considered the system which has been recently introduced to prevent waste, so far as the water-closets are concerned, what is your view upon that subject?—There is one evil attending the supply of water-closets directly from the main. In Liverpool there has been recently, in consequence of the fearful mortality which has prevailed in that town, a great outcry to abolish the cesspools and open privies; to convert those places, that is, to remove them and substitute water-closets; that has been partially done in Liverpool, and a service-pipe has been taken direct from the main or subsidiary main to such water-closets. Now this has taken place, and a great outcry has been raised against it; the soil-pan has been fouled with excreta and neglected, and when the water in the service main has been drawn off, either incidentally or for repairs, a vacuum has been created, and the soil has been sucked back through the supply-pipe into the service main, and so carried on, and has contaminated the water of a whole district. That has been cried out about, and has been set up as an argument against the use of water-closets or their substitution for privies. But what is the answer to that? Two sets of conditions must have taken place or three sets before such a contamination could possibly exist. The soil-pan must be grossly neglected and fouled by its inhabitants, and the water-pipe must be in direct and immediate connection with the service main, and the service taps for that water-pipe must be either negligently or wilfully left open to allow the soil to be drawn back through the aperture. The remedy for that is to insist in all cases where a water supply is given to the water-closets or the soil pan, that there should be a small service-box into which the water flows, and from which it is discharged into the soil-pan or water-closet, and such apparatus with its service-box can be put up at first cost of from 1 *l.* 10 *s.* to 2 *l.*

3731. *Chairman.*] Is this a different apparatus from that which you condemned generally in your former answer, when you told us that all these contrivances were failures, or is it the same?—No; there are several kinds of what are termed "water waste preventers;" there was one adopted at Croydon, in which there was a tube with a ball, and this ball ascended with the current of water when it was turned on, and was supposed to fall down by its own gravity, and close the orifice when the supply ceased, but it never came to any good.

3732. The answer you gave before was a general answer, that all these contrivances were such failures that you could not recommend them?—I did not mean that answer to apply to a properly contrived service box for a soil pan or water-closet.

3733. Mr. *Wilkinson.*] Such as Guest and Chrimes, of Rotheram?—Yes; such as Guest and Chrimes.

3734. You think by the adoption of those modes the waste, so far as the water-closet is concerned, may be prevented?—Not only the waste, but the possibility of that fearful fouling that I have described.

3735. That would, I presume, point to the necessity of a very careful supervision to see that all these improved systems were carried out whatever system might be adopted?—In my opinion, any system of water supply, whether intermittent or constant, necessitates a constant and a careful supervision.

3736. Have you considered at all the mode in which that supervision should be carried out, and what machinery there should be to carry it out?—There ought to be at the command of the engineer a set of what are termed fitters, whose duty it should be to have the supervision over all the services; and if there are turncocks, as there are in London, they should be compelled every day to report to the office that they come from if any leakage is seen, either in the mains, the stand-pipes, the valves, or the services; then I think the engineer, or his sub-engineer, ought to send a fitter at once to make those repairs and put the apparatus in working order.

3737. But, in your judgment, should there be some independent authority who should have power to decide upon any question between the consumer and the supplier?—I think where, as in the case of this metropolis, you are supposed to be entirely at the mercy of a trading company, it would be an enormous advantage that some central authority should have power for general supervision, and especially power to listen to and pay attention to any appeal for remedy or alteration; for instance, if my service were improper in quality, and inefficient in quantity, it is quite true I may appeal to the company, but it is at the option of that company whether they will or not pay sufficient attention to my appeal, or such as I may consider is requisite; now if I had an external power of appeal, I think that the companies would be much readier to pay attention to the appeals when made; in the east end of London, where the poor are left very frequently without water, such a court of appeal I think is necessary.

3738. Not only so far as the company are concerned, but so far as the landlords and the occupiers of the poor class of houses are concerned, there should be a compulsory obligation imposed upon the companies subject to an independent authority?—Yes; and where an Act of Parliament is passed, as the Chairman has mentioned, there wants some enforcing power to compel the company to do their duty according to the requirements of Parliament.

3739. I do not know whether it has come under your knowledge as to the effect of the Act of 1852, or whether you have had occasion to consider the sufficiency of the provisions of that Act?—I do not remember sufficiently distinctly all

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all its provisions; I think before it can be made compulsory a certain number of ratepayers are to be assembled together and are to request the company to do it, and that, literally, is impracticable.

3740. If you have considered the Act sufficiently, perhaps you will express to the Committee your opinion as to whether you think it should be made more stringent, or extended in any way?—I think that that Act, like many others passed recently, requires to be followed by a power of supervision and enforcement. Something like the Smoke Act; there is a General Smoke Act, which provides that smoke shall not be poured out so as to be a nuisance, but it is not followed by special inspection, and therefore, in most towns, it is a dead letter.

3741. So far as the actual provisions of that Act are concerned, I understand that you cannot express an opinion whether they should be enlarged, or whether they should be made more extensive, or in any way altered?—No; I have not paid sufficient attention to that Act to speak to it.

3742. Can you give the Committee any information as to the cost of the change that would be involved in introducing a constant supply?—That cost would depend in some respects upon the distance that the properties are from the services, and the kind of apparatus that is required to be put up; I can only state that in the case of cottages lying contiguous, if the main went down the ordinary street, an ordinary service pipe and tap might be put into each house at a cost varying from 10*s.* to 15*s.* the first cost.

3743. That is supposing the constant supply to be introduced for the first time?—Yes.

3744. Do you think there would be any great increase in expense between changing the system and introducing for the first time the constant system?—No; because you would be beginning *de novo;* you would be beginning a new supply; you would be simply adding the house apparatus to the main service.

3745. *Chairman.*] There is another thing you might tell us. Having examined and inspected the supply taps, where there is a constant supply, what are the arrangements in the town, which in your judgment has the water supply best managed, and which is that town?—I do not know of any town which is better managed than Manchester, upon the whole; but there is a drawback there.

3746. Tell us first of all the good in the system adopted in Manchester, and then state what the drawback is?—Manchester is a large place, with its half a million of population having a constant supply, as we are told by Mr. Bateman, and there the economy is so great that the expenditure made for domestic purposes does not exceed about 15 or 16 gallons per head; the apparatus of course must be of a very good kind to produce that result.

3747. What is the goodness in the arrangement there, which in your judgment would recommend it?—The Manchester system is simply giving an independent supply to each court or each tenement.

3748. What is the distinguishing feature of the Manchester supply which would recommend it as an example to be followed?—I had perhaps better take some town which I have had myself to do with. Take Wigan. Now in Wigan each cottage has its independent supply. The supply pipe or communication pipe is taken either from the branch main or from the true main; but if it is a block of court houses all lying contiguous, one wrought-iron inch pipe is taken into the midst of that property, a stop-tap is put upon that inch pipe, and from that inch pipe three-eighths pipes with three-eighths taps are taken into each cottage tenement, many of those houses being rated below 5 *l.* a year rent, so that you get a one-inch pipe as the service main, as you may term it, for that property, and a small three-eighths branch, with a three-eighths tap within each tenement.

3749. That is inside the house in the same room?—That is inside the house in same room.

3750. With a sink under it?—Yes.

3751. What is the system as to the water-closet or the privy?—In Wigan they have not carried out the water-closet system in the cottages.

3752. It is the dry system?—It is similar to Manchester, that has the cesspools and privies; the water-closet system has not been carried out, because, until the summer, they have not had a full supply of water; at this present time a new reservoir is being brought into use, which will double the volume that they have at command; and, I believe, it is the intention of the borough engineer there to introduce the soil pan, and abolish the privy.

3753. At present there is no water supply at all to the privies?—Not to the privies.

3754. Nor is there any flushing at all in any way; it is the dry system altogether?—It is the dry system; every house in Wigan is drained, and every cottage, and every ash pit; all moisture is taken away from them.

3755. Mr. *Wilkinson.*] What is the supply per head at Wigan, or the consumption?—The consumption at Wigan has been managed by the borough engineer, and he has not had, sometimes, more than six or seven gallons per head, but he has made that serve, by his supervision, in a most wonderful manner, showing what supervision will do.

3756. There has been no deficiency of supply?—No.

3757. *Chairman.*] I suppose there are water-closets in the better class of houses?—There are.

3758. What is the rental generally of the houses in Wigan, having water-closets?—From 10 *l.* to 20 *l.*; in all the hotels they have the ordinary water-closets with the intervening cistern, and the water-closet apparatus.

3759. Mr. *Wilkinson.*] And a constant supply going on of course, the whole time?—Yes; in Worthing the constant supply was in operation, but they were obliged to discontinue it; there are about 1,200 water-closets in use there; the pumping machinery was not of sufficient capacity, and the well was not sufficient; a new well is now being sunk, which will be completed this summer, and the constant supply will be resorted to and carried out again.

3760. *Chairman.*] The supply was not sufficient, for what reason?—It was not sufficient for the actual supply of the whole population; we could not get more than about 120,000 gallons a day for a population in the winter of 7,000, and in the summer varying from 12,000 to 14,000.

Cross-examined by Mr. *Denison.*

3761. Then we are to take Wigan as the model place, are we?—You can take Wigan as a place.

3762. But you heard the Chairman's question, it is not mine; what is your best place?—Where every house has an independent supply of water.

3763. Will you answer my question; is Wigan to be taken as the best place that you are acquainted with for the supply of water?—As good as any I know, and Lancaster you may take also.

3764. Is Lancaster in the same condition?—Yes, except that in Lancaster nearly all the privies and ash-pits have been abolished, and water-closets substituted.

3765. How much water per head have they in Lancaster?—From 20 to 30 gallons.

3766. From 20 to 30 gallons. I should like to know between the 20 and the 30, how much it comes out?—I have not had anything to do with Lancaster for the last seven or eight years. I only know that, besides supplying the whole population, they get a very large income from supplying all the railways.

3767. If you cannot tell me how much it is, I cannot help it?—I can tell you this. I am a Member of the Hospital, and Barrack Commissioner for the British Army, and we have had some very careful experiments made within these last twelve months as to the consumption necessary for soldiers in barracks, for all purposes, and the result we have arrived at is, 16 gallons per head.

3768. And the model place, Wigan, is six gallons per head?—I do not know what Wigan is now.

3769. That is what you told us five minutes ago, surely?—I said the engineer had managed with six or seven gallons.

3770. That is to say they had six or seven gallons?—Yes.

3771. My learned friend introduced you as one of the Commissioners for preventing the pollution of rivers, and my other learned friend, who made a speech the other day, quoted what you had done there, and you ended by reporting something about constant supply, did not you?—Yes.

3772. Did you take any evidence upon the subject of constant supply?—No.

3773. Were you desired by the Queen to look into that subject?—Yes.

3774. Will you just tell me in what passage of the Commission you were desired

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desired to look into the constant supply system?—Not into the constant supply, but into the water supply system generally.

3775. You told me you took no evidence, and therefore we can see what your opinion is founded upon. I ask you now if you were desired by the Queen to inquire into that at all?—Not expressly in those words.

3776. I will read the words, and you shall see what you are directed to inquire into. "Whereas we have deemed it expedient, for divers good causes and considerations, that a Commission should forthwith issue for the purpose of inquiring how far the present use of rivers, or running waters in England, for the purpose of carrying off the sewage of towns and populous places, and the refuse arising from industrial processes and manufactures, can be prevented without risk to the public health, or serious injury to such processes and manufactures, and how far such sewage and refuse can be utilised or got rid of, otherwise than by discharge into rivers, or running waters, or rendered harmless before reaching them; and also for the purpose of inquiring into the effect on the drainage of lands, and inhabited places of obstructions to the natural flow of rivers or streams caused by mills, weirs, locks, and other navigation works, and into the best means of remedying any evils thence arising;" that was the Commission, was not it?—That was the Commission; during the prevalence of cholera, I was requested by the Privy Council to make a special examination of the east end of London, and to report to the Privy Council.

3777. Do you mean a further requisition, or a requisition contained in this Commission?—It is not embodied there; it was by a separate letter received from the Privy Council during the prevalence of the cholera, that I individually with Dr. Buchanan was directed to make that inquiry.

3778. I ask about the particular report of yours, and one of the Mr. Harrison's, and Mr. Way?—Yes.

3779. In that list of places which you enumerated (none of them very large ones), what changes have been made from intermittent to constant supply?—None at all; they have all been constant.

3780. Have you had any experience of change from intermittent to constant supply?—Not in my own person.

3781. You have not had it?—I mean not as engineer; but I have had experience as a Government officer, inquiring where the change has taken place.

3782. You mentioned a certain number of places, in which you had had experience?—As engineer in chief.

3783. In none of those places have you had any experience of the change from the intermittent to the constant system?—No.

3784. I will open the door to you if you wish it; will you tell me what places you have had experience in any capacity of the change from intermittent to constant?—I have had no experience except making myself generally acquainted with the circumstances.

3785. That is to say, you have been to certain places, and you have heard certain things?—Yes.

3786. Is it upon that experience that you gave that answer which the Chairman seemed to be struck with, about there being only a pressure for the fire-service in London of 10 feet?—At certain points.

3787. Do you mean that is a general or a fair average representation of the pressure for fire purposes in London?—So far as my knowledge goes, as you get nearer to the incoming mains you will certainly have a much greater prressure.

3788. That is a long way from answering my question; you volunteer this statement that there is not pressure for the fire services in London generally as we understand, of more than 10 feet; is that an answer that you stick to?—It is.

3789. It is?—Yes; that is to say, you could not screw a hose upon the services, so far as I know them, all round Charing Cross and the district intervening between that and Kensington, and get more than 10 feet; take a mile radius from Charing Cross all round, so far as I know the district, and I do not suppose that you could get 10 feet pressure.

3790. If anybody was such a fool as to put on a hose for the purpose of reaching the top of a house in case of a fire, he would get no water by that means for the purpose?—I do not know that he would.

3791. You say you do not think he would; that is the result of your observation?—

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vation?—If the companies were to shut off all the services round, hereby concentrating the whole of the water, by screwing down the valves exceptionally, they very likely might get that pressure.

3792. I talk of things as they are; the result of your observation or information, or something else, is, that it would be quite absurd to expect to reach the top of a house at Charing Cross with the present pressure?—So far as I know it would.

3793. Have you read Captain Harris' evidence?—I have not.

3794. Then I recommend you, when you go home, to read it. I will ask you this question: "You have given a scheme of what you call a re-arrangement of the mains;" I observe you did not like the term "relaying," will you just tell us in other words what that means?—I can hardly tell you briefly, in a few words, what it means; I should require to have a plan, and to show you what my ideas were about it.

3795. Describe it as briefly as you can?—If you can imagine it, suppose the mains of any single company were represented upon this sheet of paper, and the incoming service was here, and all the tributaries were branching away from this, in my opinion, if that main were brought, I will say, into three points or centres, and radiated from those three points instead of from one, or radiating from a single branch, you might get a much better service.

3796. Will you just sketch it. I do not comprehend the term "radiating from three points"?—I object to be asked to go into a matter of sketching, or working out a thing, that would require me to occupy more time than I can trouble this Committee with.

3797. I am only asking you questions upon what you have volunteered. You say that the right thing to do is to re-arrange the mains in London?—I say so still.

3798. Have you considered the question enough to be able to answer this; have you made any estimate of the cost of this re-arrangement?—No.

3799. Then that which you stated just now is the most we are to have to it by way of explanation?—Yes.

3800. Now about waste preventers; all waste preventers have been found ineffective, have they?—Many of them mere waste preventers.

3801. Will you tell us of one good one?—So far as I know the intervening service box of Guest and Chrimes, for their cheap closets, is effective.

3802. That is for water-closets only?—For water-closets merely.

3803. But I mean for other supplies?—And even such a service might be used for preventing undue waste for domestic supply.

3804. Then when you said that you did not know of a single waste preventer that is effective, it seems that you do know of a single waste preventer that is effective?—If you employ that service-box for other purposes, the result will be this: the principle of that service-box is, that if the proportion for the closet is one or one and a half or two gallons, there is a sudden discharge obtained of that volume of water, and when that is done, the individual must wait until it gradually gets filled again before he can get a further supply. The same arrangement might even be introduced for domestic purposes, but it would be inconvenient, because 10 or 12 gallons might be wanted much quicker than you could get it through a box of that kind.

3805. What you mean is, that the waste preventer would be inconvenient?—It might be.

3806. The Committee have got to invent some sort of scheme; are we to take you as representing that there is a waste preventer that can be made effective or not?—Depend upon it the best method of supply is, to take the independent supply which I have described to you, into the house.

3807. So I understand you to say; then when you tell us that all waste preventers that you know of, except for this water-closet business, are ineffective, are we to take it that that is so, or that Guest and Chrimes' apparatus can be made effective for domestic service generally?—I should not like it to be taken that I say it is impossible to make an effective waste preventer.

3808. Do you know all the waste preventers?—I do not know all the existing ones; I assure you that though I have a good deal to do with, and pay a good deal of attention to these matters, things go on, and new inventions are introduced over the country, which when I come to see them, I am surprised at my own ignorance in not knowing them.

3809. You

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3809. You mean to say that you do not know of any?—I do not.

3810. Do you know anything of those that are used in the East London district?—Do you mean the small ferrule?

3811. The small ferrule; there is another thing which goes by the name of the "waste preventer," described by Captain Tyler?—I do not remember.

3812. This is at page 31 of Captain Tyler's report, "One means of combining these objects is the 'waste preventer,' to which I have already more than once referred. It is worked by a two-way cock, leading, when in its normal condition, from the supply pipe to a cast-iron chamber, holding generally a bucket full and a-half of water; and when the handle is lifted from that chamber to the outer orifice, the water is forced into the chamber, under such pressure as happens to be in the main, is kept there in the best condition in contact with air, and issues forth partially aërated, with corresponding pressure when the handle is raised. The handle falls of itself on being let go, and the chamber is self-replenished. It takes 20 seconds to empty, and in one minute it is again ready for use. There are now 40 of these waste preventers working in the East London Company's district, and giving satisfaction alike to the company, and to those who resort to them. The company are ready to afford a constant supply, wherever they are erected, and to maintain them in proper order, at a cost of 10 *s.* a year. They are used, as may be supposed, not only by the inhabitants of the courts in which they are, but by large numbers of people who flock to them from neighbouring localities. They are, in fact, the best possible description of drinking, as well as general supply fountains, and they may be fixed against a wall or at the corner of a street, or anywhere, for about 6 *l.* complete. They form altogether a very perfect arrangement for blocks, rows, courts, or collections of houses unprovided with internal means of supply." Were you acquainted with that?—Not with that special one, and if I were, I should pay no attention to it.

3813. You would pay no attention to it if you were?—No.

3814. Perhaps you would pay no attention to the ferrule contrivance?—No, I should not, excepting as a nuisance.

3815. I think there only remains one thing more to inquire about; you say you think that the waste only takes place where things are new, before people get accustomed to the system?—That it takes place to a much larger extent then than afterwards; but a waste will take place continuously if you do not look after it.

3816. Is it found that you have to keep looking after it or not?—Continually, as unceasingly as time.

3817. That is rather an odd interpretation of your former answer, that waste only takes place when things are new, is it not?—Well, if I said "only," I must correct it; I meant "more" take place; the newfangledness of anything induces tampering with it.

3818. Did you hear what has been said about Glasgow, and Chester, and Cambridge, Manchester, and several other places, how the waste immediately grows upon them, if they stop for a moment looking after it?—I am perfectly sure it will; as I say, the looking after it must be unceasing; you must never contemplate that anything will look after itself; the more you multiply it the more care you must give. For instance, if you determine in the East of London to give the 1,500,000 people now supplied by the East London and the New River Companies, constant service, if that same water is to serve, you must be prepared to multiply your supervision and your power of repair; but I believe it would be true economy, both to the companies and the persons supplied, to do so.

3819. Do not you know that in one or two of those places, in spite of all they could do, they found it impossible to keep pace with the waste?—I do not know what the persons you call "they" may have done.

3820. The people in the town?—I have heard about impossible things, and have been told about them, but I do not believe in these impossible cases.

3821. I want to know whether you know the fact that in two or three of these places they have found it absolutely necessary to give up the constant supply with any supervision?—I can only say that if I had despotic authority I should remove those persons from the place, and put others in their stead.

3822. You go beyond Mr. Bateman; his term was "unmitigated severity;" you are for "despotic authority"?—All I can say is, that I should remove the individual;

vidual; if any person told me anything of that kind I should not quarrel about it, but I should remove him immediately.

3823. "Off with his head"?—"Away with him."

Re-examined by Mr. *Cripps*.

3824. I understand, in principle, you think that supervision under any circumstances is essential, and that it is good for the consumers and the suppliers as well?—It is not only good for the consumers and suppliers, but is the truest economy, being the cheapest work that can be done.

3825. I dare say you, from your experience, are very well aware, that all new sanitary improvements that have been introduced have necessitated in their way, increased supervision?—They have.

3826. Increased supervision is almost daily and hourly exercised to keep sanitary measures going to protect the health of the people?—Yes; take for instance Glasgow, Liverpool, and Manchester; in Liverpool they have agreed to adopt the water-closet system; in Manchester they resolutely set themselves against it; but they have a supervision there in cleansing refuse that they allow to accumulate; and it cost them in the gross 20,000 *l.* a year to do it; it costs them in the nett 10,000 *l.* a year, that is the actual sum, if I may use such a term, "wasted" in Manchester in cleansing refuse, which causes excessive disease, costs the borough 10,000 *l.* a year; now, that is a supervision that is unceasing and untiring; but if they had the water-closet system, and then they took the refuse to an outlet, and applied it to a proper and useful purpose, they would save that 10,000 *l* a year in that form, and would be required to expend it in another and a more beneficial form.

3827. You were asked a question very generally about waste preventers; do you agree with what we have had stated here by engineers of experience, that the great waste occurs in the use, or rather misuse, of the water-closets?—It is in their misuse.

3828. Therefore, if there were any invention which could prevent waste in the use of the water-closets, it would save waste, generally, very considerably?—I think it would.

3829. You said you should not pay any great attention to one waste-preventer over another if you saw them; for example, the ferrule system; why do you say that?—Because in practice they are attended with, I think, more evils than they are calculated to remedy. The ferrule, from its small bore, if there is the slightest sediment in the water, or anything at all that can check it, gets choked up. The other waste-preventers, if they are to cost 10 *s.* a year to maintain, would involve more expense to maintain than the rate paid for the whole of the water supply to several tenements; for instance, take the town of Alnwick in Northumberland, every cottage, even the beggars' lodging-houses, have a soil pan, and the water rent there is not more than 1 *s.* 3 *d.* Now in the town of Keswick, where it is a commercial company, supplying for its own profit, the cottages have a constant supply of pure water from year to year, and the charge to each cottage tenement is 5 *s.* per annum, with one-fourth deducted if they pay in advance, yet I know that pays that commercial company, for I am the principal proprietor.

3830. Then I understand your opinion to be, as far as your experience goes, that you would not advise the ferrule system?—No, certainly not; nor the stand-pipe system of any kind, for domestic uses.

3831. Each party interested in his own supply of water should have his own tap?—Just so.

3832. My learned friend read to you the instructions under which the Commissioners originally acted in the inquiry relative to the pollution of rivers; were there further instructions given to you with reference to what you were to inquire into?—If the learned Counsel meant to imply that the terms of the Commission bound the Commissioners within the strict logical expression of those words, I differ from him; I am now preparing a report upon the Aire and Calder of a much larger scope; and if he were to look at the terms of the Commission, and then look at the report, he would find that the Commissioners have travelled much more widely out of them than in this case.

3833. I see these are the further instructions: "Gentlemen, I am directed by

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Secretary Sir George Grey, to transmit to you an extract of a letter from Mr. Charles Neate, and to state that it will be desirable to include in your inquiry into the pollution of rivers, the subject of the water supply, suggested by Mr. Neate, provided such extension of your inquiry will not materially impede or delay the completion of the primary object of the Commission;" and then I find, on looking at the letter, a copy of which was transmitted to you, that it is suggested that "it would be right to extend the inquiry still further, so as to include the great question of the water supply?"—Just so.

3834. Now my learned friend says that there was no evidence taken upon that?—The Rivers Pollution Commission is empowered to inquire into the pollution of rivers throughout England, and that letter was tacked on after the Commission was issued, to give us authority to inquire into the water supply as well.

3835. Just let me direct your attention to this, in order to set the matter right. Amongst other witnesses examined before you was Mr. Graves?—Yes.

3836. Was Mr. Graves' attention specially directed to this question of constant supply by your questions, and by his answers?—Yes, and Mr. Muir also; evidence was given by Mr. Graves and Mr. Muir at considerable length.

3837. You considered that one of the questions embraced in your inquiry, and which you inquired into, and reported upon accordingly?—Yes.

[The Witness withdrew.

Mr. *Wilkinson* stated that the Vestry of St. Pancras were desirous of offering some evidence upon the state of the water supply for the streets in that parish.

Mr. *William Booth Scott,* called in; and Examined by Mr. *Wilkinson.*

Mr. *W. B. Scott.*

3838. I BELIEVE you are Chief Surveyor to the vestry of St. Pancras?—I am.

3839. And have been so since the passing of the Metropolis Management Act of 1855?—I have.

3840. Of course your attention has been a good deal given to the water supply for the streets?—It has.

3841. And especially to the cost of that supply?—Yes.

3842. What is the supply of the parish for watering the streets. First of all tell me from what companies is that supply obtained?—We receive water from the New River Company, and from the West Middlesex Company.

3843. Is the proportion of the West Middlesex anything of importance at all?—We receive about 4,000,000 gallons from the West Middlesex, and about 24,000,000 gallons from the New River Company.

3844. Colonel *Hogg.*] In the year?—Yes, in the year.

3845. Mr. *Wilkinson.*] The Hampstead Waterworks are now absorbed by the New River Company, are they not?—They are.

3846. Without going into details, from time to time have you been dissatisfied with the rates charged by the New River Company, and have you been in correspondence with them with respect to those charges?—We have.

3847. The original charge was, I think, 6*d.* per thousand gallons, the supply being by meter, was not it?—No; it is our opinion that that is as much as we ought to pay.

3848. What was the original charge in 1857?—In 1857 we were paying by the area of roadway watered. We paid 5*s.* for every 100 square yards watered once a day, and 7*s.* 6*d.* for every 100 square yards watered twice a day.

3849. *Chairman.*] Was that for the year?—No, that was for the season; from Lady-day to Michaelmas; six months; that was called the water season.

3850. Mr. *Wilkinson.*] In what year was that?—In 1856.

3851. Were you satisfied with those rates?—No, we were not; we watered some new streets in that year, and the New River Company sent in a bill at the rate of 8*s.* 4*d.* and 12*s.* 6*d.* per 100 square yards.

3852. Mr. *Denison.*] In 1856 was that?—Yes, in 1856.

3853. Mr. *Wilkinson.*] Is it the fact that, in 1857, the New River Company offered to supply water by meter at 6*d.* per 1,000 gallons?—It is.

3854. That

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3854. That was in the year 1857, was not it?—It was.

3855. Now in 1862 did they increase the charge made by them?—To make it understood I should say that in 1857, when we desired to take water by meter, the company reduced the price to 4 *s.* and 6 *s.*; but we subsequently found some little interference with our men. The company's superintendents thought that they wasted the water, and we reverted to our proposal to take water by meter in 1862, and then the company asked 1 *s.* per 1,000 gallons.

3856. In 1862 the company asked 1 *s.* per 1,000 gallons?—Yes.

3857. Did you object to that increased charge?—Yes, we considered that we ought to have had it at 6 *d.*

3858. A great deal of correspondence and negotiation took place between you, I believe?—Yes; it lasted for two years nearly.

3859. Was the result of that that the company actually refused to supply any water till the vestry would consent to pay that 1 *s.*?—Practically, they did.

3860. Mr. *Denison.*] We had better have the correspondence if you come to "practically"?—I have a copy of it.

3861. Mr. *Wilkinson.*] Were the streets left unwatered for some time until the vestry complied with that request?—Yes.

3862. Did you, in fact, take out a summons for penalties for not giving a constant supply?—We did.

3863. What was the result of that summons?—That we came to a compromise before Sir Thomas Henry.

3864. What was the nature of that compromise?—We were to pay 1 *s.* per 1,000 gallons, with a certain discount off in proportion to the quantity that we took; it was at the rate of three-fourths per cent. per million.

3865. Then it results, does not it, that you pay at present for your consumption of 24 million gallons at the rate of 1 *s.* per 1,000 gallons, less the discount you have mentioned?—Quite so.

3866. Do you know what is the price provided in the New River Company's Act per 1,000 gallons for their largest consumers, consuming 200,000 gallons?—Where a customer consumes 200,000 gallons per quarter, he is supplied at the rate of 6 *d.* per 1,000 gallons.

3867. Whereas you, with a consumption of 24 millions, are charged at the rate of 1 *s.*?—It is about 10½ *d.* that we actually pay.

3868. It is 1 *s.* less the discount, is not it?—Yes.

3869. That, in your opinion, is a grievance, is not it?—We look upon it as such.

3870. Now, as to the present mode of supply, you have not in all cases a constant supply to the mains where your stand-pipes are, have you?—There are some stand-posts in which we do not get a constant supply; that is, that the supply becomes so small when the houses are being supplied, that it does not answer our purpose to take water from those posts. It takes from 15 to 20 minutes to fill a cart, which at the other posts is filled in from two to three minutes.

3871. I presume if a constant supply were introduced universally, that inconvenience would be easily remedied, would not it?—I should imagine so.

3872. You would then fix your posts anywhere, would not you?—Yes; we at present are not able to fix our posts where we should find it most convenient to do so, but we have to fix them upon such mains as are constantly charged.

3873. Does that involve the employment of more water-carts than would be necessary under a system where the mains were constantly charged?—Yes, because we could then put posts anywhere. At present we are obliged to put them where we can, and that of course increases the load or distance which we have to cart the water.

Cross-examined by Mr. *Denison.*

3874. You represent St. Pancras, I believe?—I do.

3875. You have no petition in this inquiry, have you?—I do not know, indeed.

3876. May I ask how it happens that you come here?—I had a letter from the solicitor to the Metropolitan Board of Works.

3877. May I ask for that letter?—Here it is (*handing the same to the learned Counsel*).

3878. "Dear

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3878. "Dear Sir,—Water Supply, Metropolis,—I saw Mr. Cooper to day;" who is Mr. Cooper, by the way?—He is the solicitor to the vestry.

3879. "And had some conversation relative to the evidence you could give on this inquiry, more particularly as to the non-efficiency of the Act of 1852; the want of any competent authority to carry out the Act, and the cumbersome provisions of the Act. And I shall be glad if you can meet me in Committee-room, No. 11, to-morrow morning, at 11 o'clock, with a statement in writing as to what you can speak to.—Yours truly, pro *W. Smith. R. Hogarth.*" That is the letter upon which you come, is it?—It is.

3880. Before this, apparently, Mr. Hogarth had been communicating with Mr. Cooper, your solicitor?—I should suppose so from that.

3881. You do not know otherwise than from this letter?—No, I do not.

3882. Now about this price of water, what do you say that the company are entitled to charge you?—We consider that we ought to be supplied at 6 *d.* per 1,000 gallons; and for that part of the parish which is more than 60 feet above high-water mark, the Act provides for an increase of 1½ *d.*; we ought to have it at 7½ *d.*

3883. You think so?—That is our view of it.

3884. Although Mr. Hogarth talks in his letter about the "cumbersome provisions of the Act," you know the legal machinery for getting redress, do not you?—We tried to get redress, and we found that we were compelled to come to a compromise.

3885. You came to a compromise?—We came to a compromise by paying 1 *s.* per 1,000 gallons, with a discount off.

3886. That is the compromise, is it?—Yes, that is it.

3887. Just let us hear how the compromise came off?—When we went before Sir Thomas Henry——

3888. Then you did appear before him?—We did appear before him, and the case was opened, and then instead of taking evidence upon it the matter was adjourned for the solicitor, myself, and Mr. Ware, on behalf of the company, to talk the matter over; and we considered that the difficulties of putting into operation the provisions of the Act for settling the price were such, that it would be better to come to a compromise, and we did for the time.

3889. You seem to have got over the difficulty, because you had summoned the company, and they had appeared before Sir Thomas Henry?—We found that we could only take out a summons for the penalties for not providing a constant supply. It did not fix the price; we had no way of compelling them to discuss the matter of price.

3890. You had no means, you thought?—So we considered.

3891. I understand that the New River Company is under the General Act of 1847, is that so?—I believe so.

3892. I find in the Act of 1847 this clause, "In all the pipes to which any fire-plug shall be fixed, the undertakers shall provide and keep constantly laid on, unless prevented by frost, unusual draft, or other unavoidable accident, or during necessary repairs, a sufficient supply of water for the following purposes; (that is to say) for cleansing the sewers and drains, for cleansing and watering the streets, and for supplying any public pumps, baths, or wash-houses that may be established for the free use of the inhabitants, or paid for out of any poor rates or borough rates levied within the limits of the Special Act; and such supply shall be provided at such rates, in such quantities, and upon such terms and conditions, as may be agreed upon by the Town Commissioners and the undertakers, or in case of disagreement, as shall be settled in England or Ireland by two justices, and in Scotland by the sheriff, until in either case an inspector shall have been appointed, and after the appointment of such inspector, by the inspector as appointed." That is the clause upon which you act, is not it?—I believe that clause was considered, but why the solicitor took the steps he did I cannot explain.

3893. You say that you had a summons before Sir Thomas Henry, and after having gone there, the matter being adjourned, you took 1 *s.* as a compromise?—We took 1 *s.* with the discount off as a compromise.

3894. One shilling with a discount off, as a compromise?—We were not satisfied with that. Our view of it was this, that if a customer consuming

200,000 gallons a quarter had a right to be supplied for 6 *d.* per 1,000 gallons, we, who consumed 24 millions of gallons, certainly had the same right, at any rate.

3895. The lawyers thought otherwise; did it occur to you that a customer taking 200,000 gallons of water is probably taking pretty uniformly all the year round?—Yes.

3896. Whereas you are taking street water probably only in the summer?—We extend over about eight or nine months in the year now; we commence watering early in March whenever it is necessary, and continue till October sometimes.

3897. How many months do you call it?—Probably eight months; it might run into nine months.

3898. Has your vestry ever taken any steps to enforce the fittings being put in proper order in the poor houses?—I do not know that they have

3899. That looks like your knowing that they have not?—Indeed not; it is not my department.

3900. What is your department?—I am surveyor to the vestry.

3901. What do you survey?—These matters are in the sanitary department.

3902 What do you survey?—Roads and sewers; everything but houses.

3903. As far as you know, nothing of that kind has been done?—I believe it has been, but I can only speak from my belief, that it has been done by the sanitary inspectors.

3904. What has been done?—I cannot tell you what has been done; I believe that they are constantly looking after the fittings, and seeing that there is a proper supply of water to the houses, but I cannot speak with authority.

Re-examined by Mr. *Wilkinson.*

3905. I suppose with reference to the supply being only for half a year, the difference between 24,000,000 gallons, and 200,000 gallons only, would more than compensate for any question upon that point?—Yes; I should imagine the quantity of water supplied by the companies for street watering purposes, is something like ½ per cent. upon the whole supply.

3906. As to the dispute between yourself and this company, you were advised by the solicitor that the Act in operation did not enable you to obtain justice, and therefore you consented to this compromise; is that so?—That is so.

3907. *Chairman.*] Why could not you obtain justice?—We found it difficult to follow up the steps necessary to produce evidence before Sir Thomas Henry, as to the value of the water.

3908. I understand you to say that the Company's Act directs them to supply the water to all the community in that district at the rate of 6 *d.* per 1,000 gallons?—Yes, all large consumers.

3909. All large consumers above 200,000 gallons?—Yes.

3910. What evidence have you to produce except this Act?—We were advised that it would be necessary to satisfy Sir Thomas Henry of the actual cost of supplying the water, and that we found a difficulty in obtaining evidence about, without going to a great expense.

3911. And under that advice you agreed to pay twice the rate which the company are allowed to charge?—Nearly twice the rate, and that we felt to be a grievance; we were obliged to come to that arrangement.

3912. Did you have the advice of counsel, or was it the advice of the vestry clerk?—I think counsel's advice was taken as well.

3913. Do you know upon what that was based?—The advice?

3914. Yes?—I believe a case was prepared for them.

3915. Mr. *Wilkinson.*] At any rate it was under the best legal advice that you could get?—Yes, it was.

Chairman.] It would be convenient if you could follow this out.

3916. Mr. *Wilkinson.*] You are here at the request of Mr. Cooper, the solicitor, for your own parish, I think?—I am.

3917. Through the Chairman of the Metropolitan Board?—Yes.

3918. *Chairman.*] Will you explain to the Committee how that legal opinion was arrived at; it would be desirable, because that is not apparent from what is before us at present?—I am not able to explain the legal difficulties of the case; it always was my opinion that the vestry ought to be supplied at the same rate that the company charged to large consumers; we were advised that it would be necessary to satisfy Sir Thomas Henry as to what the actual cost of the water was.

3919. If there is a defect in the Act which has resulted in such an absurdity as that, it is desirable that you should point it out to the Committee; I do not see how we are to investigate all the Acts for the purpose of discovering it.

3920. Mr. *Wilkinson.*] Mr. Cooper at that time acted as solicitor to the vestry, did he not?—Yes.

3921. Probably he would be able to explain the circumstances of the case?—No doubt he would.

[The Witness withdrew.

[Adjourned to To-morrow, at Twelve o'clock.

INQUIRY INTO THE OPERATION AND RESULTS OF THE "METROPOLIS WATER ACT, 1852."

Friday, 7th June 1867.

MEMBERS PRESENT:

Mr. Ayrton	Lord Frederick Cavendish
Mr. Henry Baillie.	Lord John Hay.
Mr. Benyon.	Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

7 June 1867.

Chairman (to Mr. *Cripps*).] Will you be good enough to explain how it occurred that the parish of St. Pancras agreed to pay 1 *s*. per 1,000 gallons less discount for the supply of water for watering the streets, when in the Company's Act the scale of charge is 6 *d*.

Mr. *Cripps*.] Sir, it is one of the difficulties I may say in a general way, which arises out of a number of different Acts relating more or less to the same subject, and their being occasionally more or less in conflict with one another. In the first place let me refer you to the Waterworks Clauses Act, 10 & 11 Vict. c. 17. At Section 37 of that Act, it is provided that, "In all the pipes to which any fire-plug shall be fixed, the undertakers shall provide and keep constantly laid on, unless prevented by frost, unusual drought, or other unavoidable accident, or during necessary repairs, a sufficient supply of water for the following purposes; that is to say, 'among other things,' for cleansing and watering the streets, upon such terms and conditions as may be agreed upon between the parties, and if not, by two justices."

Mr. *Denison*.] There is another alternative, there is an inspector to be appointed.

Mr. *Cripps*.] "And such supply shall be provided at such rates, in such quantities, and upon such terms and conditions, as may be agreed upon by the Town Commissioners and the undertakers, or in case of disagreement, as shall be settled in England or Ireland by two justices, and in Scotland by the sheriff, until in either case an inspector shall have been appointed, and after the appointment of such inspector, by the inspector so appointed."

Mr. *Toulmin Smith*.] There is an inspector in St. Pancras parish.

Mr. *Cripps*.] I am instructed that there has not been such an inspector appointed.

Mr. *Toulmin Smith*.] There must be an inspector appointed; they are bound to appoint one under the Metropolis Management Act.

Mr. *Cripps*.] I was going to explain to the Committee the reason why the parish of St. Pancras did not go on, under the advice which they received.

Mr. *Denison*.] There is no reason for you to make statements which are incorrect.

7 June 1867.

Mr. *Cripps*.] If there is any question about whether an inspector has been appointed, it must be cleared up. I am told that such an inspector has not been appointed.

Chairman.] Will you explain how you consider yourself liable to pay the 10 *d*.

Mr. *Cripps*.] Then we get the New River Company's own Act of 1852, and let me refer the Committee to Section 41 of that Act, "That the company shall, at the request of any consumer of water, for purposes other than the purposes for or in respect of which the rates or charges are hereinbefore provided, or limited, or at their own instance, afford a supply of water by means of a meter, or other instrument or mode for measuring and ascertaining the quantity of water so supplied, and may charge for such supply not exceeding the following rates per 1,000 gallons; that is to say, when the quarterly consumption of water shall not exceed 50,000 gallons, 7½ *d*.," and so on. The authorities of the parish of St. Pancras, who had to supply water for watering the streets, conceived that this being the New River Company's Act, they were entitled to get a supply of water under Clause 41 of this Act, and accordingly they proceeded to give notices under that Act. That was resisted, and therefore the parish officers took the opinion of Mr. Welsby. I need not say that that was the highest opinion which they could have taken in a matter of that kind at the time; and I will read you his opinion, which is very clear. It is not necessary that I should read to you all the case, for his opinion will show at once what the question was: "I am of opinion that the supply of water for cleansing and watering the streets is governed by the 37th section of the Waterworks Clauses Act; that the vestry are not consumers within the meaning of the 41st section of the Company's Act" (that is the New River Company's Act), "and that the 37th section of the General Act is not therefore controlled or limited by the 41st section of the other Act." That was his opinion, contrary to what we had thought. "The course of the vestry is therefore clear, namely, either to agree with the company as to the quantities in which, and the terms and conditions upon which, the water is to be supplied for these purposes, or, in case of disagreement, to apply to have such quantities, terms, or conditions settled by the police magistrate for the district. I agree with Mr. Lush" (who had also given an opinion upon the subject), "that the magistrate may well act upon the 41st section of the Company's Act in determining the price to be paid by the vestry, but he is not bound to do so, and the vestry therefore should be prepared with some evidence as to the reasonableness of such price if the application to the magistrate should become necessary. It follows that, in my opinion, no madamus such as is suggested above would lie" His opinion was this, Sir, that the 41st section of the company's own Act did not control the 37th section of the General Act; but he seemed to think this, that under Section 41 you can get by meter at the quantity supplied, and that that may be taken as some evidence of what is reasonable under Section 37; not that it was legally the one controlling the other, but the one might be a reasonable mode in the magistrate's opinion of finding out what the proper price might be. But then came this question, that although under the 41st section they were not compelled to supply by meter, yet there is nothing about a meter in Section 37; therefore they had no means whatever of availing themselves in the summons, under Section 37, of so much evidence as they might otherwise obtain under Section 41. The consequence of that was, that they acted under Mr. Welsby's advice, and made the best arrangements they could under the circumstances. Then I am reminded they did not even do that without further consulting Mr. Welsby, for Mr. Welsby and Mr. Le Breton, who seems to have been engaged in the matter with him, had a joint conference about the matter, and they give an opinion. I think that arose yesterday. One summons was abandoned and another taken out under another Act, and that was attempted under the advice of Mr. Welsby. I do not know whether the Committee wish me to read the joint opinion.

Chairman.] Yes, you had better read it.

Mr. *Cripps*.] "We have considered the statements made to us, in consultation on the subject of the charge of the New River Company, for the water supplied for watering the streets of the parish of St. Pancras, and we are of opinion

7 June 1867.

opinion that the amount to be paid for such supply in case of disagreement, is to be settled by the magistrate, under the provisions of sect. 37 of the 10th Vict. c. 17 (the General Waterworks Clauses Act), and that evidence to show what would be a reasonable charge, must be submitted to the magistrate to enable him to come to a decision. It appears also, that the New River Company neglect to keep the water constantly laid on to the pipes to which fire plugs are fixed, and that in consequence of such neglect extra expense is caused to the parish in watering the streets; and that the delay in procuring a sufficient supply of water for the engines, increases the danger to life and loss of property occasioned by fires. It is the duty of the company to keep up a constant supply to the pipes indicated, and if, upon proper request, they refuse or neglect so to do, they are liable under the 43rd section of the 10th Vict. chap. 17, to a penalty of 10*l.* and to a payment of 40*s.* for every day during which said refusal or neglect shall continue, after notice in writing shall have been given to the company of the want of supply. The penalties are recoverable by summons before a magistrate, according to the provisions of the Railways Clauses Consolidation Act, which for this purpose is incorporated into the Waterworks Clauses Act." Then, acting upon that advice, they gave the notice under the other section; the parties appeared; and I find Mr. Weisby's signature upon the brief containing the summons, issued according to his advice under that Act; and I find his memorandum at the back of it in these terms: "Agreed that the price shall be 1*s.* per 1,000 gallons, subject to a discount of three quarters per cent. up to 30,000,000; no discount, if a less quantity be taken than 10,000,000 in any year, from 1st of March to 1st of March; order to be dated 9th March." That was done under his advice, and I would only mention to you further, Sir, that then we gave the notice, that we received a letter from the solicitors of the New River Company, containing their view of the construction of this section, which I should certainly have taken great exception to; the 37th section directs that in those pipes, that is to say, in the case that we are dealing with, there should be a constant supply under any circumstances; and this is the answer of the solicitors, dated the 7th of July 1863:—"Sir, the New River Company have forwarded to us the notice, under your common seal, dated the 17th ultimo, wherein you require that company to provide and keep a constant supply in the company's mains and pipes; we would beg to call your attention to the 15th section of the Metropolis Water Supply Act, which exonerates the New River Company, in common with all the other Metropolitan Water Companies, from the liability to keep a constant supply of water in their mains until the inhabitants have complied with the requisitions of that section, and of the 29th and 31st sections of the New River Company's Act. We shall be happy to explain the matter more at large if you should still entertain any doubts upon the subject, but you will find the comparison of the two Acts with the Waterwork's Clauses Act clearly establishes that no Metropolitan Water Company is liable to keep a constant supply under present circumstances."

Mr. *Toulmin Smith* delivered in a list of the official documents which had been put in evidence on the part of the Metropolitan Water Companies. *Vide* Appendix

Mr. *Johnson* handed in the following analysis by Dr. Letheby of the water supplied by the Kent Water Company during the years 1864, 1865, and 1866.—

7 June 1867.

TABLE of the Analysis of the Kent Water, from the Pumping Well at Deptford, and from a Public Main at New Cross, in the Years 1864, 1865, and 1866 (Letheby).

Constituents per Gallon.	1864.		1865.		1866.	
	From Well.	From Main.	From Well.	From Main.	From Well.	From Main.
Carbonate of Lime and Magnesia.	14·58	13·72	14·21	14·00	15·24	15·12
Sulphate of Lime -	5·68	5·54	5·76	5·71	7·22	7·07
Alkaline Chloride -	2·21	2·14	2·27	2·27	1·78	1·74
Alkaline Nitrate - -	1·41	1·57	1·91	1·96	2·55	2·54
Silica and Alumine -	0·92	0·93	0·97	0·96	0·75	0·67
Organic matter - -	0·28	0·27	0·26	0·26	0·08	0·11
TOTAL per Gallon -	25·08	24·17	25·38	25·16	27·62	27·25
Less by incineration	1·43	1·32	1·43	1·28	1·02	1·03
Hardness (Degrees)	18·0	18·0	18·0	18·0	18·1	18·1
Ditto after Boiling -	6·1	6·0	6·4	6·3	8·0	8·0

Mr. *Toulmin Smith* also delivered in the following return of the expenditure of the five Thames Water Companies:—

EAST LONDON WATER BILLS, &c.

RETURN of Moneys Expended on Capital Account by the Lambeth Waterworks Company since 1848, when their Act passed for Changing their Source of Supply, and by the other Four Thames Water Companies since 1852, when their Acts passed for Changing their Sources of Supply.

	£.
Chelsea - - - - - - - -	525,756
Lambeth - - - - - - - -	559,321
West Middlesex - - - - - - -	292,271
Grand Junction - - - - - - -	391,440
Southwark and Vauxhall - - - - -	661,179
£.	2,429,967

7 June 1867.

The *Chairman* inquired what was the date of the Act of Parliament by which the system of drainage was imperatively changed from the dry system to the water system when water-closets were adopted.

Mr. *Cooper* stated that it was the consolidation of "The Metropolitan Commissions of Sewers Act, 1848."

The *Chairman* also requested that the Committee might be furnished with a schedule showing the capital of the different Water Companies, and their dividends before and since the passing of the Act of 1852.

Mr. *Denman* was heard to address the Committee on behalf of the Water Companies.

[Adjourned.

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Appendix, No. 1.

MORANDUM of INFORMATION required from the Water Companies under the "Metropolis Water Act, 1852," for the use of the Committee on the EAST LONDON WATER BILLS, &c.

App. No. 1.

Name of the Company?

Amount of capital in shares and in loans?

Plan showing the district supplied by the
pany, together with the description of dis-
, by the names of the parishes?

Extent of district supplied both by the
pany and by any other Company?

Number of houses and of inhabitants in
ict?

Rateable value of houses?

Number and value above and under 20 *l.*,
ther limitation in the Company's Act, fixing
fferent rate of charge for the supply of
r?

Situation of sources of supply of water;
ition of the gathering area?

Situation, extent, and nature of reservoirs,
of filtering beds, length and nature of chan-
from source of supply to place of distribu-
?

). Situation, nature, and extent of works and
hinery for distribution?

l. Nature of arrangements made for constant
oly, number of houses so supplied, and the
iculars of all the proceedings and measures
en by or in respect to the Company, to give
ct to clause 15 of the Act, and the views of
Company, as to the best mode of carrying
same into effect?

2. Statement showing the length of streets
olied with service pipes of different dimen-
s?

3. The dimensions of fire-plugs, and the ex-
of supply of water which may be obtained
n each class of mains and fire-plugs in case of
?

4. Accounts during the last three years pre-
ed in accordance with section 19 of the Act;
, showing the dividends and interest paid on
ital and loans during the same period?

5. Statement of the extent to which sections
23, and 24 of the Act are carried into effect,
violated by the inhabitants?

6. Statement of number of cases annually
ing the last three years in which water has
n cut off under section 25, with classification
causes?

17. Regulations made by the Company under clause 26?

18. Average quantity of water supplied daily, during the last year, and also during the years 1856 and 1861, showing the increase of supply?

19. Quantity of water at the source of supply, beyond that taken for supply by the Companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

20. Nature and extent of the natural facilities existing for storing water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works.

21. Appropriation of water supplied, as far as can be estimated under the following or other convenient heads:

(*a.*) For watering the streets, fires, and other similar purposes.

(*b.*) For manufactures, except of drinkable commodities, and for stables and cattle.

(*c.*) For cleansing waterclosets, baths, and other domestic purposes, except for food and drink.

(*d.*) For food and drink.

22. Approximate estimates of the future requirements of water supply for the metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

23. A statement of the several rates and charges which the Company is empowered to make, with a reference to the section and chapter of the Act conferring such powers.

24. A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases.

25. A print of all the local Acts now in force relating to the Company.

26. Has any notice been given, or have any measures been taken under section 27 of "The Metropolis Water Act, 1852," or under section 67 of the 25 & 26 Vict. c. 102, or under sections 11 and 12 of the Sanatory Act of 1866 (29 & 30 Vict. c. 90); if so, state the dates, and short particulars thereof?

NEW RIVER COMPANY.

New River Company.

RETURN of the New River Company of Information required from the Water Companies under the "Metropolis Water Act, 1852," for the use of the Committee on the East London Water Bills, &c.

1.—Name of the Company?

The Governor and Company of the New River brought from Chadwell and Amwel to London.

2.—Amount of capital in shares and in loans?

	£.
Capital as fixed by Act of 1852	1,519,958
Ditto raised by Act of 1866	88,660
	1,608,618
Bond debt under Acts 1852, 1854, and 1857	795,865
Debenture stock, under Act of 1857, raised to extinguish bond debt	204,935
	£. 2,609,418

3.—Plan showing the district supplied by the Company, together wit the description of district, by the names of the parishes?

The places and parishes in which the New River Company supply water are as under:—

St. Martin-in-the-Fields.
St. Paul, Covent Garden.
St. Mary-le-Strand.
St. Clement Dane.
Savoy Precinct.
St. John-the-Baptist, Savoy, Strand.
St. James, Westminster.
St. Anne, Soho.
Rolls Liberty.
St. Andrew, Holborn-above-Bars.
St. George-the-Martyr.
Saffron Hill.
Hatton Garden.
Ely Rents.
Ely Place.
St. Sepulchre Without.
St. Giles-in-the-Field.
St. George, Bloomsbury.
St. James and St. John, Clerkenwell.
St. Luke, Middlesex.
St. Mary, Islington.
St. Pancras.
Holy Trinity, Minories.
St. Katherine Precinct (Docks).
The City of London.
St. Mary, Whitechapel.
Christchurch, Spitalfields.
Norton Folgate.
St. Leonard, Shoreditch.
St. John, Hackney.
St. Mary, Hornsey.
St. Mary, Stoke Newington.
Highgate Hamlet.
St. John, Hampstead.
St. Botolph, Aldgate Without.
Inner Temple.
Middle Temple.
Thavies' Inn.
Staple Inn.
Barnard's Inn.
Lincoln's Inn.
Gray's Inn.
Great and Little Amwell.
St. Margaret.
Hoddesdon.
Wormley.
Broxbourne.
Cheshunt.
Enfield.
Edmonton.
Tottenham.

4.—Extent of the district supplied both by the Company and by any other Company?

The undermentioned parishes are supplied by the New River Company, in conjunc- tion with other Companies, or Boards of Health:—

St. Martin-in-the-Fields.
St. James, Westminster.
St. Pancras.
St. Katherine Precinct.
St. Mary, Whitechapel.
Christchurch, Spitalfields.
Norton Folgate.
St. Leonard, Shoreditch.
St. John, Hackney.
St. Mary, Stoke Newington.
St. John, Hampstead.
Enfield.
Tottenham.

Appendix, No. 1

New River Company.

5.—Number of houses and of inhabitants in district?

112,964 houses had supply from the New River Company at the end of the past year. It is estimated that there are about 800,000 inhabitants in these houses.

6.—Rateable value of houses?

£.4,054400.

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of Water?

The following are the limitations in the New River Company's Act (1852) which fix different rates of charge, with an estimate of the number of houses and aggregate value applicable to each limitation.

	Rate per Cent.	Rate of Charge for Extras.	Number of Houses.	Aggregate Annual Value.
				£.
Not exceeding 30 *l.* annual value - - -	4	- - - - - -	50,778	914,000
Exceeding 30 *l.* and no texceeding 50 *l.* - -	4	4 *s.* and 2 *s.* for each additional -	38,132	1,525,300
„ 50 100 *l.* -	4	6 *s.* and 3 *s.* „ -	17,751	1,189,300
„ 10 200 *l.* - -	4	8 *s.* and 4 *s.* „ -	2,156	279,280
„ 200 300 *l.* - -	3	10 *s.* and 5 *s.* „ -	236	64,020
„ 300 - - -	3	12 *s.* and 6 *s.* „ -	145	82,500
			109,198	4,054,400

8.—Situation of sources of Supply of Water; condition of the Gathering Area?

The New River Company's sources of supply are as follow:

1. The Chadwell Spring in Hertfordshire.
2. The River Lea.
3. Deep wells on the line of the New River, and at Hampstead Heath and Hampstead Road.
4. Small springs taken into the New River in its course.
5. Springs at Hampstead and Highgate, collected in ponds for watering roads and other such uses.
6. The Thames below Blackfriars Bridge, whence water may be pumped and distributed by separate mains for street and sewer uses, should need for so doing arise.

9.—Situation, extent, and nature of Reservoirs, and of Filtering Beds, length and nature of Channels from source of supply to place of distribution?

2 subsiding reservoirs at Cheshunt, having together an area of about -	18½	acres.
2 subsiding reservoirs at Hornsey, having together an area of about -	8	„
2 subsiding reservoirs at Stoke Newington, having together an area of about - - - - - - - - - - - - - -	42½	„
1 subsiding reservoir at New River Head, Clerkenwell, having an area of about - - - - - - - - - - - - -	¾	„
Ponds at Hampstead and Highgate aforesaid, having together an area of about - - - - - - - - - - - - - -	30	„
3 filtering beds at Hornsey, having together an area of about - -	2	„
3 filtering beds at Stoke Newington, having together an area of about -	5	„
3 filtering beds at New River Head, having together an area of about -	2¼	„

Two additional filtering beds, having each an area of one acre, are in course of construction at Stoke Newington.

Water is brought to the above-named reservoirs by a channel, the total length of which (from sources in Hertfordshire to the New River Head) is about 28 miles. This channel is an open but protected river for about 25½ miles of its course. It consists for the rest of its length of lines of pipe or tunnel.

Appendix, No. 1.

New River Company.

10.—Situation, nature, and extent of Works and Machinery for Distribution.

The New River Company's works and machinery for distribution consist of steam engines at Hornsey, Hornsey-lane, Highgate, Stoke Newington, and New River Head (of an aggregate power of about 1,450 horses); covered service reservoirs at Claremont-square, Maiden-lane, Highgate, and Hampstead, of a joint capacity of about 20,000,000 of gallons; with main and service pipes of diameters varying from 3 inches to 36 inches, and a total length of about 620 miles.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by or in respect to the Company, to give effect to clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect.

Clause 15. "*Provision for constant supply of water by every Company.*"

The New River Company have provided engine power, service reservoirs, and mains in preparation for constant supply, and about 1,200 separate houses in their district have such supply; but no requisition has yet been made under the 15th section of "The Metropolis Water Act" for constant supply in any part of their district. And it is the view of the Company that, until consumers have incurred the trouble and cost of such a renewal of the water apparatus of their houses as shall effectually prevent a negligent or wilful waste of water, and shall be ready to submit to the constant supervision which would be needful to maintain the said apparatus in proper condition, the general adoption of constant supply in the New River district is not practicable.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

About 340 miles of road and street contain New River Company's pipes of different dimensions.

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs in case of fire?

Fire-plugs in the New River district have a diameter of two inches. It may be estimated that they are each usually capable of discharging from 12,000 to 20,000 gallons per hour.

14.—Accounts during the last three years prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

Section 19. "*Accounts of Receipt and Expenditure of Rates, &c., to be prepared and to be open for inspection.*"

These accounts, which are given below, show, in addition to the requirements of Section 19, the dividends and interest paid on capital and loans during the last three years. It is proper to add that, in October 1866, the Company divided amongst their proprietors 100,800 *l.* in reduction of a fund established in 1854, and consisting of appropriations from revenue profits, to meet any accidental failure of the works carried out under the requirements of their Acts, it being considered that the consolidation of those works might then be relied upon.

Appendix, No. 1.

New River Company.

The New River Company.

Abstract of their Accounts of Receipt and Expenditure for the Year 1864.

RECEIPT.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
Water rents for houses, trades, watering streets, and water sold in bulk	218,709	10	10	Ordinary expenses of repairing and maintaining the works, and of collection of revenue	105,682	16	11
Ground rents and rents for land, &c.	8,869	4	9	Interest on money borrowed	38,335	11	8
Miscellaneous receipts	6,689	13	1	Dividends to proprietors	69,768	–	–
Appropriation from money borrowed on bonds, &c., for new works, extensions, &c., under the company's Act	23,158	16	8	£. s. d. *Note.*—Capital as settled by Act of 1852 - 1,519,958 – – Additions, to 1864 inclusive - 949,097 3 5 £. 2,469,055 3 5			
				Amount carried to Contingency Fund by way of reserve	20,482	–	1
				Purchase of lands, &c., for new works, improvements on river, pipes, pipe-laying, and other outlay	23,158	16	8
£.	257,427	5	4	£.	257,427	5	4

New River Office.

John Miles, Chairman.
Charles Hulse, Auditor.
E. Toller, Accountant.
Fredc. Inglis, Clerk.

The New River Company.

Abstract of their Accounts of Receipt and Expenditure for the Year 1865.

RECEIPT.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
Water rents for houses, trades, watering streets, and water sold in bulk	225,013	4	8	Ordinary expenses of repairing and maintaining the works, and of collection of revenue	106,303	4	8
Ground rents and rents for land, &c.	8,772	8	6	Interest on money borrowed	38,592	6	9
Miscellaneous receipts	5,921	10	2	Dividends to proprietors	82,800	–	–
Appropriation from money borrowed on bonds, &c., for new works, extensions, &c., under the company's Act	27,502	14	2	£. s. d. *Note.*—Capital as settled by Act of 1852 - 1,519,958 – – Additions, to 1865 inclusive - 976,599 17 7 £. 2,496,557 17 7			
				Amount carried to Contingency Fund by way of reserve	12,011	11	11
				Purchase of lands, &c., for new works, improvements on river, pipes, pipe-laying, and other outlay	27,502	14	2
£.	267,209	17	6	£.	267,209	17	6

New River Office.

John Miles, Chairman.
H. C. Bowles Bowles, Auditor.
E. Toller, Accountant.
Fredc. Inglis, Clerk.

Appendix, No. 1.

New River Company.

THE NEW RIVER COMPANY.

ABSTRACT of their ACCOUNTS of RECEIPT and EXPENDITURE for the Year 1866.

RECEIPT.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
Water rents for houses, trades, watering streets, and water sold in bulk - -	232,606	15	7	Ordinary expenses of repairing and maintaining the works, and of collection of revenue - - - - -	114,280	12	10
General rents and rents for land, &c. -	9,437	5	10	Interest on money borrowed - - -	41,545	10	6
Miscellaneous receipts - - - -	7,174	10	3	Dividends to proprietors - - -	92,880	–	–
Appropriation from money borrowed on bonds, &c., for new works, extensions, &c., under the company's Act - -	32,170	16	5	*Note.*—Capital as settled by Act of 1852 - £. 1,519,958 – – Additions, to 1866 inclusive - - - 1,008,709 17 9 £. 2,528,667 17 9			
				Amount carried to Contingency Fund by way of reserve - - - - -	512	8	4
				Purchase of lands, &c., for new works, improvements on river, pipes, pipelaying, and other outlay - - -	32,170	16	5
£.	281,389	8	1	£.	281,389	8	1

New River Office.

John Miles, Chairman.
Geo. Anderson, Auditor.
E. Toller, Accountant.
Alex. Inglis, Clerk.

15.—Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect or violated by the inhabitants?

Section 22.—" *Cisterns to be supplied with proper ball-cocks or other apparatus, whenever water shall be constantly laid on.*"

Section 23.—" *Cisterns, closets, and baths to be so constructed as to prevent waste, or the flow or return of impure matter into the mains, &c.*"

Section 23 of the Metropolis Water Act of 1852 is frequently violated by the inhabitants.

More than 19,000 cases of defect in the cisterns, cocks, and lead pipes of houses were dealt with by the Company's officers during the past year.

Section 24.—" *Restricting communication with the pipes of the Company.*"

Occasional violations of the 24th Section of the Metropolis Water Act of 1852 are found to occur.

16.—Statement of number of cases annually during the last three years in which water has been cut off under Section 25, with classification of causes?

Section 25.—" *Water may be cut off in certain cases.*"

During the last three years water has been cut off, for a time, for the prevention of waste, from the undermentioned number of houses:—

271 houses - - - - -	in 1864
559 „ - - - - -	in 1865
222 „ - - - - -	in 1866

17.—Regulations made by the Company under Clause 26?

Section 26.—" *Regulations to be made with the approval of the Board of Trade.*"

The Company have regulations requiring such pipe, stop-cocks, cisterns, and ball-cocks as shall fulfil the conditions which are prescribed by Section 23 of the Metropolis Water Act of 1852, and by similar Sections in the New River Act of 1852, and the Waterworks Clauses Act of 1847.

New River Company.

18.—Average quantity of water supplied daily, during last year, and also during the years 1856 and 1861, showing the increase of supply?

The New River Company supplied daily, on an average, during the year - -	1856 - -	23,396,400 gallons.
Ditto - - - - ditto - - -	1861 - -	22,837,000 ,,
Ditto - - - - ditto - - -	1866 - -	22,898,769 ,,

19.—Quantity of water at the source of supply beyond that taken for supply by the companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

From the sources already named, there may be obtained, with existing works, more than 35,000,000 gallons per day.

20.—Nature and extent of the natural facilities existing for storing water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works?

By storing water in the valley of the Lea, in accordance with powers which the New River Company, in conjunction with the East London Waterworks Company, already have (through the River Lea Act of 1855), addition may be made to the quantity of water at the Company's command.

The New River Company will be ready to undertake whatever works may be required for this purpose, or for the augmentation of their supply by other means, whenever there appears to be any need for their so doing. But they have not as yet had reason to decide so certainly on any particular plan of works as to be able, at present, to submit estimates.

21.—Appropriation of water supplied, as far as can be estimated, under the following or other convenient heads:

(*a*) For watering the streets, fires, and other similar purposes.

Of the water supplied by the New River Company, during the past year, it may be estimated that—

About	219,000,000	gallons	were consumed for	sewer and street purposes,
,,	1,280,000,000	,,	,,	public buildings and trade.
,,	40,000,000	,,	,,	public baths and washhouses.
,,	6,825,000,000	,,	,,	domestic purposes.

22.—Approximate estimates of the future requirements of water supply for the Metropolis, within the district of the company, for the next 50 years, and of the best means of providing for them?

At the rate at which houses have of late been added to the New River district, and with the average rate of consumption per house which obtains now, the demand on the New River Company's resources, at the end of the next 50 years, would exceed the present delivery of water in their district by about 13,000,000 gallons per day, on an average for the year.

The means by which such increase may be provided for have been indicated above.

23.—A statement of the several rates and charges which the Company is empowered to make with a reference to the section and chapter of the Act conferring such powers.

The New River Company are empowered by the 35th section of their Act 1852, to supply water for domestic purposes at the following rates:—

For Water supplied to any Dwelling House.

Where the annual value does not exceed 200*l.*, at a rate per centum per annum on such value not exceeding 4*l.*

Where such annual value exceeds 200*l.*, at a rate per centum per annum on such value not exceeding 3*l.*

New River Company.

If there be a water-closet or water-closets, or fixed bath or baths, or any high service in such dwelling-house or place, then, in addition to the rates above specified, the following rates are payable:

Where the annual value of such house exceeds 30*l.* but does not exceed 50*l.*, a rate not exceeding 4*s.* per annum for each single water-closet, fixed bath, or high service, and a further sum of 2*s.* for each additional water-closet, fixed bath, or high service.

Where such annual value exceeds 50*l.* but does not exceed 100*l.*, a rate not exceeding 6*s.* per annum for each single water-closet, fixed bath, or high service, and a further sum of 3*s.* for each additional water-closet, fixed bath, or high service.

Where such annual value exceeds 100*l.* but does not exceed 200*l.*, a rate not exceeding 8*s.* for each single water-closet, fixed bath, or high service, and a further sum of 4*s.* for each additional water-closet, fixed bath, or high service.

Where such annual value exceeds 200*l.* but does not exceed 300*l.*, a rate not exceeding 10*s.* for each single water-closet, fixed bath, or high service, and a further sum of 5*s.* for each additional water-closet, fixed bath, or high service.

And where such annual value exceeds 300*l.*, a rate not exceeding 12*s.* for each single water-closet, fixed bath, or high service, and a further sum of 6*s.* for each additional water-closet, fixed bath, or high service.

The expression "high service" above made use of, is defined by the 36th section of the Act, as meaning a delivery of the water at an elevation of more than 10 feet above the ground floor of the dwelling-house or other place supplied.

Supplies at a greater elevation than 160 feet above Trinity high-water mark are, by the 37th section of the above Act, chargeable with 1*l.* per cent. per annum on the annual value, in addition to the above rates.

By the 41st section of the same Act the Company are empowered to supply water for purposes other than those above referred to, by means of a meter, or other instrument or mode of measuring and ascertaining the quantity supplied, at the following rates:—

If the quarterly consumption of water does not exceed 50,000 gallons, 7½*d.* per 1,000 gallons.

Exceeding 50,000 gallons and not exceeding 100,000 gallons, 7*d.* per 1,000 gallons.

Exceeding 100,000 gallons and not exceeding 200,000 gallons, 6½*d.* per 1,000 gallons.

Exceeding 200,000 gallons, 6*d.* per 1,000 gallons.

And a further rate not exceeding 25*l.* per centum per annum in respect of water so supplied at an elevation of more than 60 feet above Trinity high-water mark.

By the 39th Section the Company are empowered to take rates exceeding the rates and charges above specified, by agreement with the person or body requiring a supply of water, notwithstanding the provisions of the above Act, or any Act incorporated therewith.

The 40th Section authorises them to supply any person or body within their limits with water, to be used within such limits for other than domestic purposes, at such rates and upon such terms and conditions as shall be agreed upon between the Company and the person or body requiring such supply.

By the 37th section of the Waterworks Clauses Act, embodied with this Company's Act, 1852, the Company are to supply water for cleansing sewers and drains, for cleansing and watering the streets, and for supplying any public pumps, baths, or wash-houses that may be established for the free use of the inhabitants, or paid for out of any poor-rates or borough rates levied within the limits of their Act, at such rates as may be agreed upon by the Town Commissioners and the Company; or, in case of disagreement, by two justices, until an inspector shall have been appointed, and after such appointment by the inspector so appointed.

Section 27 of "The Metropolis Water Act, 1852," provides that an allowance of 20 per cent. shall be made from this Company's Parliamentary rates in the case of any house or houses laid on by requisition of the churchwardens or overseers of the poor in any parish, providing it appear that by such allowance the annual supply could be furnished at a rate not exceeding 3*d.* per week.

24.—A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases.

The rates and charges actually made by the Company are in strict accordance with the powers conferred upon them, as stated in the answer to Question No. 23, and in ordinary cases of domestic or trade supply the rates specified are simply carried out.

The following are the principal "Allowances" or reduced rates:—

When owners of small house property undertake payment of the rates, an allowance of 10 per cent. is made in the case of houses for which the rate ordinarily payable would be above 20*s.* and under 27*s.* per annum. An allowance of 20 per cent. when the water rate is 20*s.* and under, and in cases where the property has been shown to be extremely poor, an allowance of 25 per cent. has usually been made.

When water is supplied to a house occupied only by a care-taker, an allowance is made from the rate, reducing the charge to a small amount, varying from 5 *s.* to about 20 *s.* per annum.

The charge for water supply to warehouses is usually from 1 *l.* to 2 *l.* per annum, but in some cases where the premises are large, it exceeds the latter amount.

Modifications of other rates are made in special cases according to circumstances.

Special Rates.

Street watering is charged by the area watered, at 1 *s.* per 100 superficial yards per calendar month (watering twice a day, excluding Sundays). If a meter be used to determine the quantity, the charge is 1 *s.* per 1,000 gallons. If the quantity consumed during the season exceed 1,000,000 gallons, a discount of ¾ per cent. for every complete million is allowed up to 30 millions.

Water for flushing sewers, courts, and alleys is supplied at the rate of 4 *s.* per plug per hour.

Urinals supplied by meter are charged at the rate of 6 *d.* per 1,000 gallons.

Urinals are also in many cases charged at a computed rate, varying from 4 *s.* to 3 *l.* 15 *s.* 9½ *d.* per compartment per annum.

Supplies of water for building purposes are charged at 6 *d.* per rod of brickwork.

Drinking fountains, when provided with spring taps and cisterns, are supplied gratuitously, provided the Company approve of the site; but if the water be constantly running, a rate of 6 *d.* per 1,000 gallons is charged where the height of supply does not exceed 60 feet above Trinity high-water mark, and 7½ *d.* at any higher level.

Cabstands are usually supplied at 3 *l.* per annum.

Fire mains on private property are supplied with water under pressure at the following rates:

	£.	s.	d.
Sealed firecock on main	1	1	–
Unsealed - ditto	–	10	–
Firecocks on service connected with a tank	–	5	–

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New River Company.

TRADE CHARGES.

Schedule, No. 1.

Non-Domestic uses of Water, with the Measure of Consumption, and the corresponding Price charged for Low-service under ordinary circumstances.

Trade or Use.	Measure.	Price.
Bakers - - - - -	Annual value - - -	As per Schedule, No. 2.
Basket makers - - -	Meter or cisternage - -	Parliamentary rates.
Baths - - - - -	- - ditto - - -	- - ditto.
Beershop keepers - - -	Annual value - - -	As per Schedule, No. 2.
Bent timber manufacturers -	Meter or cisternage - -	Parliamentary rates.
Blacking manufacturers - -	- - ditto - - -	- - ditto.
Blacksmiths - - - -	No. of anvils - - -	4 *s.* per anvil.
Bone boilers - - - -	Meter or cisternage - -	Parliamentary rates.
Brass founders - - -	- - ditto - - -	- - ditto.
Brewers - - - -	- - ditto - - -	- - ditto.
Brick and tile makers - -	No. of stools in fields -	50 *s.* per stool as heretofore.
British wine manufacturers -	Meter or cisternage - -	Parliamentary rates.
Butchers (not slaughtering) -	Annual value - - -	As per Schedule, No. 2.
Ditto (slaughtering) - -	Meter or cisternage - -	Parliamentary rates.
Cab proprietors - - -	No. of cabs and horses -	As per Schedule, No. 2.
Chemists, manufacturing -	Meter or cisternage - -	Parliamentary rates.
Coach makers - - -	- - ditto - - -	- - ditto.
Coffee rooms - - - -	Annual value - - -	As per Schedule, No. 2.
Confectioners, manufacturing -	Meter or cisternage - -	Parliamentary rates.
Cow keepers - - - -	No. of cows - - -	As per Schedule, No. 2.
Crucible manufacturers - -	Meter or cisternage - -	Parliamentary rates.
Curriers and leather dressers -	- - ditto - - -	- - ditto.
Dining rooms - - -	Annual value - - -	As per Schedule, No. 2.
Distillers - - - -	Meter or cisternage - -	Parliamentary rates.
Dairymen (not cow keepers) -	Annual value - - -	As per Schedule, No. 2.
Dyers - - - - -	Meter or cisternage - -	Parliamentary rates.
Feather purifiers - - -	- - ditto - - -	- - ditto.
Fishmongers (large) - -	- - ditto - - -	- - ditto.
Ditto - (small) - -	Annual value - - -	As per Schedule, No. 2.
Fountains - - - -	Meter or cisternage - -	1 *s.* per 1,000 gallons.
Ginger beer makers - -	- - ditto - - -	Parliamentary rates.
Greengrocers - - - -	Annual value - - -	As per Schedule, No. 2.
India rubber manufacturers -	Meter or cisternage - -	Parliamentary rates.
Ink makers - - - -	- - ditto - - -	- - ditto.
Livery stable keepers - -	No. of horses - - -	As per Schedule, No. 2.
Laundresses - - - -	No. of women - - -	6 *s.* when the occupants of the house *only* are employed, with 4 *s.* additional for each hired woman, provided washing is not carried on for more than three days per week.
Leather dyers - - -	Meter or cisternage - -	Parliamentary rates.
Paper hanging manufacturers -	- - ditto - - -	- - ditto.
Paper marblers - - -	- - ditto - - -	- - ditto.
Perfumery distillers - -	- - ditto - - -	- - ditto.
Photographers using the negative process.	*No. of operators,* in large cases, cisternage and height of service.	4 *s.* each.
Pickle manufacturers - -	Meter or cisternage - -	Parliamentary rates.
Porkmen (slaughtering) - -	- - ditto - - -	- - ditto.
Ditto (not slaughtering) -	Annual value - - -	As per Schedule, No. 2.
Printers - - - -	Cisternage or No. of men -	1 *s.* each as before.
Publicans - - - -	Annual value - - -	As per Schedule, No. 2.
Soap boilers - - - -	Cisternage - - -	Parliamentary rates.
Starch makers - - -	- ditto - - -	- - ditto.
Stone and marble masons -	No. of stone sawyers - -	2 *s.* each.
Tobacco pipe manufacturers -	Cisternage - - -	Parliamentary rates.
Tripe dressers - - -	- ditto - - -	- - ditto.
Wine Merchants (bottle washing)	Cisternage - - -	Parliamentary rates.
Garden taps, in ordinary cases -	Annual value - - -	Parliamentary rates for extras.

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New River Company.

SCHEDULE, No. 2.

Trade.	Annual Value of Premises.	Rate.		Remarks.
		s.	d.	
Baker - - -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	6 8 10	– – –	With 2 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Beershop - - -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	8 12 16	– – –	With 4 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Butcher - - - (not slaughtering).	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	4 6 8	– – –	With 2 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Coffee-rooms - -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	8 12 16	– – –	With 4 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Dining-rooms - -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	10 14 18	– – –	With 4 *s.* additional for each 10 *l.* or part of 10 *l.* in annual value.
Fishmongers (small) -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	6 8 10	– – –	With 2 *s.* additional for each 10 *l.* or part of 10 *l.* in annual value.
Greengrocers - -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	4 8 10	– – –	With 2 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Porkmen - - - (not slaughtering).	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	4 6 8	– – –	With 2 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Publicans - - -	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.* „ 55 *l.* „ „ 65 *l.*	12 16 20	– – –	With 4 *s.* additional for each 10 *l.* or part of 10 *l.* in annual value.
Dairymen - - - (not cow keepers),	Not exceeding 45 *l.* - - - - - Exceeding 45 *l.*, and not exceeding 55 *l.*	8 12	– –	With 4 *s.* additional for every 10 *l.* or part of 10 *l.* in annual value.
Laundries - -	The regular charge - - - -	6	–	With 4 *s.* additional for each extra woman employed.

Appendix, No. 1.

New River Company.

25.—A Print of all the local Acts now in force.

The New River Company's Act, 1852.
The New River Company's (Hertford Sewerage Diversion) Act, 1854.
The New River Company's Act, 1854.
The New River Company's Act, 1857.
The New River Company's Act, 1866.

No. 26. Has any notice been given, or have any measures been taken under section 27 of "The Metropolis Water Act, 1852," section 67 of the 25 & 26 Vict. c. 102, sections 11 & 12 of "The Sanatory Act, 1866" (29 & 30 Vict. c. 90); if so, the dates and short particulars thereof?

Reply.—Section 67 of 25 & 26 Vict. c 102, was merely an adaptation of section 27 of the Metropolis Water Act of 1852, to places within the limits of the Metropolis Local Management Act of 1855, but those limits are not co-extensive with the areas supplied by the New River and other Metropolitan Companies, which extend to many parishes outside such limits. In the year 1858 the New River Company was applied to by the parish of Hornsey (which is not within the limits of the Metropolis Local Management Act) to supply water under section 27 of the Act of 1852. An order of the vestry of that parish was made, which included all the houses where a supply of water seemed to the local authorities to be needed, and which were within reach of the mains of this Company. The order included 133 cottages, and all of them were immediately supplied with the necessary apparatus, and the water laid on according to the requirements of the section.

There have been no applications under sections 11 and 12 of the Sanatory Act, 1866.

Alex. Inglis,
Clerk of the New River Company.

27 May 1867.

Appendix, No. 1.

East London Waterworks Company.

EAST LONDON WATERWORKS COMPANY.

MEMORANDUM of Information furnished by the EAST LONDON WATERWORKS COMPANY, for the use of the Committee on the East London Water Bills, &c.

1.—Name of the Company?

East London Waterworks Company.

2.—Amount of capital in shares and in loans?

	£.
Ordinary stock - - - - - - - - - - - - -	975,000
New shares, bearing interest at 4½ per cent. per annum until 1868, when they will become Ordinary Stock - - - - - - - - -	325,560
Unissued shares - - - - - - - - - - - - -	99,440
TOTAL - - £.	1,400,000

The Company has no loan capital.

3.—Plan showing the district supplied by the Company, together with the description of district, by the names of the parishes?

The district supplied by the Company comprises the following parishes and places:—

In the county of Middlesex, Whitechapel, Mile End Old Town, Mile End New Town, Spitalfields, Bishopsgate (part of), Artillery Ground, St. Botolph Aldgate (part of), St. George-in-the-East, Shadwell, Limehouse, Wapping, Ratcliff, Bow, Bromley, Poplar, Bethnal Green, Shoreditch (part of), Hackney, and Tottenham (part of).

In the county of Essex, the parishes of West Ham, East Ham, Low Leyton, Walthamstow, Wanstead, Woodford, Chigwell, and Loughton.

4. Extent of the district supplied both by the Company and by any other Company?

In practice the Company do not supply any district in which another Company has pipes, but the Parliamentary district, which the Company are authorised to supply, includes Bishopsgate Within, St. Luke Old-street, Stoke Newington, Tottenham, Kingsland, Shacklewell, and Holloway, which are supplied by the New River Company.

The South Essex Water Company's Parliamentary district overlaps the Company's district to a small extent, but no pipes have been laid by the South Essex Company in the district actually supplied by the Company.

5.—Number of houses and of inhabitants in district?

The number of houses supplied is - - - - - - - - -	91,975
The number of inhabitants, taking an average of 7·30 per house (Whitechapel containing 9·11, and Hackney 6·26 per house), is - - - -	672,000

6.—Rateable value of houses?

The rateable value of the dwelling houses charged for water at Christmas, 1866, was - - - - - - - - - - - - - £.1,870,760

This sum does not include the value of houses or premises having supplies by meter as to the value of which the Company have no information.

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of water?

Not exceeding 20 *l.* per annum - - - - - - - - - -	56,397
Above 20 *l.* and not exceeding 30 *l.* - - - - - - - - -	19,532
Above 30 *l.* and not exceeding 50 *l.* - - - - - - - - -	11,494
Above 50 *l.* and not exceeding 100 *l.* - - - - - - - -	3,060
Above 100 *l.* - - - - - - - - - - - - -	263
Meter supplies - - - - - - - - - - - -	1,229
Total - - -	91,975

Appendix, No. 1.

East London Waterworks Company.

8.—Situation of sources of supply of water, condition of the gathering area?

The source of the supply is the River Lea. The point of abstraction is Higham Hill, in the parish of Walthamstow. The sources of the Lea river and its tributaries, the Mimram, the Beane, the Rib, the Ash and the Stort, are in the northern parts of Hertfordshire, Bedfordshire, and Essex. The gathering area comprises 450 square miles, almost entirely agricultural and pastoral. The population of the gathering area is about 122,000. The land is well kept and cultivated. The subsoil is chiefly chalk, with some gravel and clay.

9.—Situation, extent, and nature of reservoirs, and of filtering beds, length and nature of channels from source of supply to place of distribution?

The Company's reservoirs at Walthamstow contain about 110 acres of water area, capable of holding 220 million gallons; 170 million gallons of which can be withdrawn by simple sluices and the remainder by pumping. The reservoirs are uncovered, and are constructed with proper clay puddled walls on clay bottom.

The Company have a covered basin or reservoir at Old Ford, containing about 2¼ acres of water area, from which the water is pumped into the mains for a part of the supply. This basin was constructed in 1810, and was covered in 1855.

There are also two uncovered reservoirs at Old Ford, of an area of 9½ acres; these were thrown out of use in 1855, and in 1866 were completely severed from any part of the present works of supply.

From the uncovered reservoirs at Walthamstow the water passes by a special private canal, about 1¼ miles in length, with puddled sides and a clay bottom, to the filtering beds at Lea Bridge.

These filtering beds have a sand area of 12 acres. They are formed in two series, divided into 13 beds, and are supplied exclusively by the special canal.

From the filtering beds the water is conveyed by a covered brick channel, 6 feet by 3½ feet in section and 239 yards in length, to the northern or Lea bridge pumping station, and by an iron main 4 feet in diameter, and 4,240 yards in length, to the southern or Old Ford pumping station.

10.—Situation, nature, and extent of works and machinery for distribution.

The works for distribution are principally comprised in the two stations, at Lea Bridge and Old Ford.

At Lea Bridge there are two engine houses, with steam engines of 300 horse power.

At Old Ford there are five engine houses with steam engines of 640 horse power.

At Lea Bridge some water power is usefully employed in addition to the steam above described; and at Walthamstow there are auxiliary engines (steam and water) of 130 horse power.

The "horse power" of all the engines is not nominal, but actual measurement in work done.

The power in the gross is equal to the delivery of 4,200 cubic feet per minute, or nearly 38 million gallons daily (or about double the Company's average daily supply), if all the engines were worked continuously; the maximum of actual work rarely reaches 4,000 cubic feet per minute, and the minimum sometimes falls below 1,000 cubic feet per minute.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by or in respect to the Company, to give effect to clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

Clause 15. "*Provision for constant supply of water by every Company.*"

Some few applications to the Company respecting constant supply have been from time to time made, but it is believed that in none of them were the applicants prepared to comply with the terms of the 15th section of the "Metropolis Water Act, 1852," and no such application has been pressed, arrangements satisfactory to the parties having been made.

Soon after the passing of the Act of 1852, the Company commenced serving the houses in new streets, on a system of special supply, which, although continuous, is not "constant supply" in the ordinary acceptation of that term. The water is laid on under adequate pressure, but with a ferrule inserted in the communication pipe for regulating the quantity supplied.

In this arrangement any service-pipe commanded by one cock has been treated as if it were a "district main" under the 15th section of the Act.

At least four-fifths of the new houses in new streets built in the Company's district, within the last few years, have had the special supply laid on.

The Company require cisterns in all cases, and put no limit on their size. They regulate

Appendix, No. 1.

East London Waterworks Company.

late the orifice of the ferrules according to the size and situation of the house, so as to give about 20 gallons per head per day, or, say, 160 gallons per house.

The subjoined table will show to what extent the supply of water for domestic purposes has been given on this system:—

	Houses.		Houses.
1854 - -	2,898	1861 - -	12,712
1855 - -	4,134	1862 - -	15,140
1856 - -	5,299	1863 - -	18,000
1857 - -	6,000	1864 - -	20,000
1858 - -	7,056	1865 - -	22,497
1859 - -	9,000	1866 - -	25,305
1860 - -	11,000		

These figures do not include supplies by meter.

The number of existing houses altered from intermittent to special supply has not been great, as parties are deterred by the expense and by the difficulty of compelling dissentient tenants on the same service to adapt their fittings to receive it.

It is found, moreover, that the majority of occupiers who have the intermittent supply are satisfied with it if their cisterns or butts are of sufficient dimensions, a matter entirely within the control of themselves and the owners.

The Company consider the special system adopted by them as satisfactory and the best mode of furnishing a continuous supply for the class of houses in their district, which (see answer to question 7) are almost entirely small houses.

The Company are of opinion that "constant supply," in the ordinary acceptation of that term, can only be given upon terms as least as protective to the Company as those contained in the 15th section of the Act of 1852.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

The actual length of streets supplied, without reference to there being one, two, or six lines of pipes, is estimated at 300 miles. The length of pipeage is as follows:—Pipes of and exceeding six inches diameter, always called "mains," and constantly charged, but only in a very few cases used for the attachment of communication pipes, 147 miles.

Pipes under six inches diameter, always called "service pipes," some constantly charged, the others turned on once a-day, 328 miles.

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs, in case of fire?

The diameter of the orifice of the fire-plugs in the Company's district is at the smallest part 2¼ inches. The extent of water delivered from the fire-plug orifices varies with the pressure at the time the plug is drawn, but averages from 200 to 300 gallons per minute.

14.—Accounts during the last three years prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

Section 19.—"*Accounts of Receipt and Expenditure of Rates, &c., to be prepared and to be open for inspection.*"

YEAR ENDING MIDSUMMER, 1864.	£.	s.	d.	£.	s.	d.
Receipts—						
Water Rates - - - - - - -	114,998	6	5			
Other sources, including moneys levied under powers of Act of Parliament - - - -	50,071	1	2			
				165,069	7	7
Expenditure—						
Current expenses - - - - - - -	40,967	6	5			
New works, &c. - - - - - - - -	12,924	8	1			
				53,891	14	6
Balance - - - - - - - £.				111,177	13	1

Dividend paid on Ordinary Stock, 6 *l.* per cent.
Ditto New Shares, 4½ *l.* per cent.

Appendix, No. 1.

East London Waterworks Company.

Section 19.—*Accounts of Receipt and Expenditure of Rates, &c.*—continued.

YEAR ENDING MIDSUMMER, 1865.

	£.	s.	d.	£.	s.	d.
Receipts—						
Water Rates	120,748	17	11			
Other sources, including moneys levied under powers of Act of Parliament	73,294	6	6			
				194,043	4	5
Expenditure—						
Current expenses	45,260	8	4			
New works, &c.	54,433	10	9			
				99,693	19	1
Balance - - - - - - - £.				94,349	5	4

Dividend (including bonus) paid on Ordinary Stock, 7 *l.* per cent.
Dividend on New Shares, 4½*l.* per cent.

YEAR ENDING MIDSUMMER, 1866.

	£.	s.	d.	£.	s.	d.
Receipts—						
Water Rates	129,317	10	4			
Other sources, including moneys levied under powers of Act of Parliament	26,236	18	10			
				155,554	9	2
Expenditure—						
Current expenses	42,151	7	9			
New works, &c.	53,358	14	5			
				95,510	2	2
Balance - - - - - - - £.				60,044	7	–

Dividend (including bonus) paid on Ordinary Stock, 7 *l.* per cent.
Dividend on New Shares, 4½ *l.* per cent.

The Company divide the profits of each year amongst the proprietors. All works in extension are paid for out of moneys raised on capital account.

15. Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect or violated by the inhabitants?

Section 22.—"*Cisterns to be supplied with proper Ball-cocks or other apparatus.*"

Section 23.—"*Cisterns, Closets, and Baths to be so constructed as to prevent waste, or the flow or return of impure matter into the drains, &c.*"

The provisions of clauses 22 and 23 are constantly evaded, and whether the supply of water be delivered on the intermittent or continuous system, the owners and occupiers exhibit the most damaging indifference with respect to the state of the fittings and apparatus connected with the water supply, and in some parts of the district the taps and fittings are frequently stolen.

This Company have found it necessary to organize a complete staff and office to examine, force, maintain, record, and enforce repairs, and register non-repairs, objections, and difficulties.

The Company believe that the most effective or only remedy in their district and similar districts against an extravagant and destructive waste on the constant supply system, will be found in the adoption of limiting ferrules or orifices, adjusted so as to give an adequate supply to the consumer, and by which the loss of water from waste and misuse cannot exceed a known limit.

Section 24.—"Restricting communication with the pipes of the Company."

This has not been contravened.

16. Statement of number of cases annually during the last three years in which water has been cut off under Section 25, with classification of causes?

Section 25.—"*Water may be cut off in certain cases.*"

	1864.	1865.	1866.
For broken lead pipes	185	233	240
Ditto Ferrules	2	2	9
For Waste	4	20	10

17. Regulations made by the Company under Clause 26?

Section 26.—" *Regulations to be made with the approval of the Board of Trade.*

The Company have not found it necessaryto make any regulations under this Section. They have from time to time issued circulars calling attention to the provisions of the Acts of Parliament, and stating the terms of their supply by meter and otherwise, and they have no reason to believe that these terms have been considered otherwise than satisfactory.

18. Average quantity of water supplied daily during the last year, and also during the years 1856 and 1861, showing the Increase of supply.

	Gals.	Increase.
1856 - - -	14,562,684	
1861 - - -	16,837,113 - - -	2,274,429
1866 - - -	19,380,739 - - -	2,543,626

The average is given as for 365 days in the year.

19. Quantity of water at the source of supply beyond that taken for supply by the Companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

The quantity of water passing by the point at which a systematic gauging is carried on, viz., Field's Weir (at the junction of the Stort and Lea), which is below the New River Company's source of (Lea) supply at Hertford, and 12 miles above the Company's source of supply at Higham Hill, was—

	Cubic Feet per Minute.	Deduct E. L. Company's consumption. Cubic Feet per Minute.	Surplus at Field's Weir. Cubic Feet per Minute.
In 1864, January - -	4,226	1,976	2,250
April - - -	6,439	1,947	4,492
July - - -	2,498	2,167	331
October - -	2,043	1,771	272
Average of the year -	4,655	1,937	2,718
In 1865, January - -	4,841	1,889	2,952
April - - -	5,172	1,987	4,185
July - - -	2,851	2,126	725
October - -	13,818	2,090	11,728
Average of the year -	7,508	2,043	5,465
In 1866, January - -	26,161	2,004	24,157
April - - -	13,092	1,999	11,093
July - - -	5,533	2,287	3,246
October - -	6,850	2,282	4,568
Average of the year -	12,916	2,160	10,756

These figures will not show the quantity of water acquired by the River Lea between Field's Weir and Higham Hill, nor the quantity taken by the New River Company at Tottenham, nor that taken by the River Lee Trustees, and used for navigation purposes. The Company are unable to give any reliable information on these points.

20. Nature and extent of the natural facilities existing for storing water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works?

There are several eligible sites for the construction of reservoirs in the flanking valleys on the Essex side of the line of the River Lea, where, if land could be had at a moderate price, reservoirs might be made at a cost of 1,000 *l.* per acre of water 12 or 18 feet deep. Up to a certain extent, these reservoirs, which are looked upon as stores from rainy seasons for dry seasons, might be filled with some certainty every season; but there are occasional dry winters which would leave the filling of very large reservoirs doubtful. These reservoirs ought to be so placed as to allow of the water being drawn from them by separate channels not liable to be reached by flood waters.

Appendix, No. 1.

East London Waterworks Company.

21. Appropriation of water supplied, as far as can be estimated under the following or other convenient heads:—

	Gallons per Day.
(*a*) For watering the streets, fires, and other similar purposes -	1,000,000
(*b*) For manufactures, except of drinkable commodities, and for stables and cattle - - - - - - - - - -	4,000,000
(*c*) For cleansing water-closets, baths, and other domestic purposes, except for food and drink - - - - - - -	14,380,000
(*d*) For food and drink, including manufacture of drinkable commodities - - - - - - - - - -	
Of this 14,380,000 gallons it is possible that two-thirds are used for the purposes stated in paragraph (*c*), but no reliable estimate can be made.	
Total Supply per Day in 1866 - Gal.	19,380,000

22. Approximate estimates of the future requirements of water supply for the Metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

The scale of increase in the delivery of water in this Company's district has been to double itself in 19 years, to treble itself in 27 years, and if like rates of increase prevail would quadruple itself in 41 years; but there are reasons which throw doubt on the continued prevalence of the same rates of increase.

It is difficult to give even an approximate estimate of the requirements of the district for the next 50 years, but in the prospect of considerable and continued increase, the Company have in the present Session brought into Parliament the Bills which are now before the Committee, for authorising them to increase their Reservoir area in the Lea Valley by 100 acres, and to supplement their supply from the Lea by taking 10 million gallons per day from the Thames at Sunbury.

The Company believe that with proper precautions and care (legislative and other), the Thames and the Lea, with their respective tributaries, will supply all the wants of the Metropolis, and will afford the best means of doing so.

23. A statement of the several rates and charges which the Company is empowered to make, with a reference to the section and chapter of the Act conferring such powers?

"East London Waterworks Act, 1853."

Section 74.—For domestic purposes (as defined by Section 72), a rate per annum on the annual value of the house, not exceeding - - - - - - - - - -	5 *l.* per cent.
Section 75.—Where the annual value of the house exceeds 30 *l.*, for every single water-closet and fixed bath, an additional rate per annum not exceeding - - - - - -	4 *s.*
Where the annual value exceeds 50 *l.*, but does not exceed 100 *l.* - - - - - - - - - -	6 *s.*
Where the annual value exceeds 100 *l.* - - - -	8 *s.*
Section 75.—For high service (as defined by Section 73), in addition to the foregoing rates, not exceeding 25 per cent. upon those rates respectively.	

Section 79.—For supplies by meter.

In respect of Ordinary Service.

When the quarterly consumption of water does not exceed 50,000 gallons - -	(per 1,000 gallons)	9 *d.*
Exceeding 50,000 and not 100,000 - -	ditto. -	8 *d.*
Exceeding 100,000 and not exceeding 200,000	ditto. -	7 *d.*
Exceeding 200,000 gallons - - - -	ditto. -	6 *d.*

In respect of High Service.

Not exceeding 25 per cent. additional.

Sections 78 and 80 authorise the Company to supply water at other charges by agreement.

Section 82 authorises the Company to let for hire any meter, pipes, and apparatus, on terms to be agreed upon.

"Waterworks Clauses Act, 1847."

Section 37.—For cleansing sewers, watering streets, public pumps, baths, &c., rates fixed by agreement, or by two Justices in case of difference.

24. A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases.

The Company charge according to the authorised scale, except in the case of charitable institutions, which are supplied at half the authorised rates.

25. A print of all the local Acts now in force relating to the Company.

"East London Waterworks Act, 1853."
"East London Waterworks Extension of Time Act, 1854."
"River Lea Water Act, 1855."
"East London Waterworks Act, 1862."

No. 26. Has any notice been given, or have any measures been taken, under the Section 27 of "The Metropolis Water Act, 1852", or under Section 67 of the 25 and 26 Vict., cap. 102, or under Section 11 and 12 of "The Sanatory Act of 1866 (29 and 30 Vict., cap. 90)"; if so, state dates and short particulars thereof?

Several instances have arisen in the company's district in which, owing to movement by local boards of health, local boards of works, and sewer authorities, the necessary works have been executed for enabling houses to receive a supply of water.

So far as the company has cognisance of such matters, they arise thus: the local authority desiring the supply to be furnished, inquires of the company whether, on the completion of the necessary works, the company will be prepared to lay on water according to the rate desired. The company has invariably answered these inquiries in the affirmative, being always desirous to facilitate all such action; and having so consented, they have heard no more of the cases until, on the completion of the works, they have been called on to inspect them and lay on the water.

Inspection has thereupon taken place, the water has been laid on, and the rate collected as in ordinary cases. Whether what had taken place between the owner and the local authority in the meantime had been by the compulsory application of any of the statutory provisions mentioned in the question applicable in the particular case, or whether the local authority and the owners or occupiers of the property had come to an arrangement, the company have not inquired, or, at all events, they have preserved no record of anything which their officers may at the time have learned on the subject.

The following are instances recorded by the company in which such transactions as are above mentioned have taken place (that is to say), water has been laid on under such circumstances by the company after works completed in:—

Date.	No. of Houses.	Situation.	At the Instance of, or after Communication with,
29 June - 1860	2	Windmill-lane, 1 and 2	The West Ham Board of Health.
	13	Well-street, 1 to 13	ditto.
	4	ditto	ditto.
	3	South-street	ditto.
	3	Francis-street	ditto.
	1	ditto	ditto.
	7	ditto	ditto.
	2	North street	ditto.
5 January 1859	13	Elephant and Castle-court, Walthamstow.	The Wanstead Board of Health.
		Pigwell-lane	The West Ham Board of Health.
20 August 1862	29	Vicarage-place, Vicarage-lane.	ditto.
23 July - 1862	6	ditto	ditto.
11 February 1867	7	Castle-yard, Woodford	The Woodford Board of Health.
21 December 1866	14	ditto	ditto.
25 September 1866	4	Waterworks-row	The West Ham Board of Health.
16 April - 1867	9	Pinnock's place, Plaistow	ditto.
16 July - 1866	13	Nursery-terrace, Plaistow	ditto.
12 December 1860	15	ditto	ditto.

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East London Waterworks Company.

Date.	No. of Houses.	Situation.	At the Instance of, or after Communication with,
18 October 1861	7	Waterloo Inn, Vicarage-lane.	The West Ham Board of Health.
18 February 1863	-	Well-street and India-row	The Poplar Board of Works
15 June 1864	11	Greengate-street, Plaistow	The West Ham Board of Health.
3 August 1864	9	Pigwell-lane	- ditto.
3 August 1864	9	Greengate-street	- ditto.
		King George-street	- ditto.
9 May 1866	2	Brook-street, Clapton, 1 and 2.	The Hackney Board of Works.
1 June 1866	Piggery	White Post-lane	- ditto.
31 July 1866	11	Hammond's Cottages, Lea Bridge.	- ditto.
7 September 1866	Piggery	Old Ford Road	The Poplar Board of Works
7 September 1866	- ditto	- ditto	- ditto.
7 September 1866	- ditto	- ditto	- ditto.
7 September 1866	- ditto	- ditto	- ditto.
7 September 1866	- ditto	- ditto	- ditto.
7 September 1866	- ditto	- ditto	- ditto.
25 August 1866	- ditto	White Post-lane	The Hackney Board of Works.
25 August 1866	- ditto	- ditto	- ditto.
18 August 1866	9	Mount Pleasant-lane	- ditto.
18 August 1866	5	Truman Cottages, High-hill Ferry.	- ditto.
24 August 1866	2	George-terrace, Brook-street, Clapton.	- ditto.
24 August 1866	4	- ditto	- ditto.
24 August 1866	1	- ditto	- ditto.
25 August 1866	1	Mount Pleasant-lane	- ditto.
30 August 1866	3	Bower-road, White Post-lane.	- ditto.
1 September 1866	4	George terrace, Brook-street, Clapton.	- ditto.
1 September 1866	2	Wood-street, Clapton	- ditto.
8 September 1866	1	North-street, Cambridge Heath.	- ditto.
13 September 1866	2	Pleasant Cottages, Brook-street.	- ditto.
21 September 1866	1	George-terrace, Brook-street.	- ditto.
9 October 1866	2	Lister's Cottages, Brook-street.	- ditto.
1 December 1866	2	- ditto	- ditto.
4 December 1866	4	- ditto	- ditto.
31 December 1866	2	Birch Cottages, High-hill Ferry.	- ditto.
8 April 1857	4	Brook-street	The Hackney Board of Works.
28 June 1861	3	Gift-lane	The West Ham Board of Health.
2 March 1862	2	Vicarage-lane	- ditto.
28 June 1862	19	Sun-row	- ditto.
TOTAL Houses	267		

In December 1866, the vestry of Mile End Old Town applied to the company suggesting that the company's supply was insufficient in Mulberry-court, Stepney Green, and asking a constant supply. This application was beyond the provisions referred to in the question, and may or may not have been intended as an application in respect of them. The company replied that they would furnish a constant supply if the necessary works were done, but they have heard no more of the matter.

E. Bates,
Secretary.

East London Waterworks Company's Office,
St. Helen's-place.
30 May 1867.

Appendix No. 1.

Chelsea Waterworks Company.

CHELSEA WATERWORKS COMPANY.

RETURN of the CHELSEA WATERWORKS COMPANY of information required from the Water Companies under the "Metropolis Water Act, 1852," for the use of the Committee on the EAST LONDON WATER BILLS, &c.

1.—Name of the Company?

The Governor and Company of Chelsea Waterworks.

2.—Amount of capital in shares and in loans?

	£.
Stock - - - - -	615,600.
Loans - - - - -	170,000.

3.—Plan showing the district supplied by the Company, together with the description of district, by the names of the parishes?

The district supplied by the Company is coloured blue on the accompanying plan. The parishes supplied by the Company are:—

St. Luke, Chelsea.
All Saints, Fulham (part of).
St. Mary Abbott's, Kensington (part of).
Kensington Palace and Precincts thereof.
St. George, Hanover-square (the out-wards).
St. James, Westminster (part of).
St. Martin-in-the-Fields (part of).
St. Margaret, Westminster.
St. John the Evangelist, Westminster.

4.—Extent of the district supplied both by the Company and by any other Company?

The Chelsea Company supply the whole of the district with the exception of the public buildings in the neighbourhood of Whitehall and Palace Yards, which are supplied by Government.

5.—Number of houses and of inhabitants in district?

Number of houses, &c., supplied - - -	26,900
Number of inhabitants (estimated) - - -	170,000

6.—Rateable value of houses?

£. 1,228,000.

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of water?

	No.	*Value.*
Not exceeding 30 *l.* - - - -	10,808	£. 216,000
Exceeding 30 *l.* and not exceeding 50 *l.* -	8,389	336,000
Exceeding 50 *l.* " " 100 *l.* -	4,209	316,000
Exceeding 100 *l.* " " 200 *l.* -	1,142	171,000
Exceeding 200 *l.* " " 300 *l.* -	301	75,000
Exceeding 300 *l.* " " - -	190	76,000
Stables, &c. - " " - -	1,909	38,000

8.—Situation of sources of supply of water; condition of the gathering area?

The River Thames, at Seething Wells, above Kingston-upon-Thames, and three miles above Teddington Lock. The river is confined to one stream at this place, and comprises the whole gathering area of the Thames above Seething Wells.

Appendix No. 1.

Chelsea Waterworks Company.

9.—Situation, extent, and nature of reservoirs, and of filtering beds, length and nature of channels from source of supply to place of distribution?

The reservoirs and filtering beds are at Seething Wells, close to the river bank, and comprise an area of five acres. The conveyance from the source of supply is one iron pipe, 30 inches diameter, and one 15 inches diameter, to the Company's reservoirs on Putney Heath, which comprise an area of four acres.

10.—Situation, nature, and extent of works and machinery for distribution?

These consist of steam-engines and pumping machinery, at Seething Wells, of collective power of 1,025 horses, which convey the water to the reservoirs on Putney Heath, at an elevation of 165 feet above the Thames, from whence it flows by gravitation through pipes to the district.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by, or in respect to the Company, to give effect to Clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

Clause 15.—"*Provision for constant supply of Water by every Company.*"

The arrangements made by the Company comprised the construction of the large reservoirs on Putney Heath before mentioned, and the laying of 24-inch mains from there to the district. At present 109 buildings and manufactories have constant supply.

Many circumstances tend to repress constant supply in the Company's district. The leaden pipes and brass work are not strong enough to bear the constant pressure, and the drainage is imperfect in many places. In the poorer districts the landlords are averse to incurring any expense, and the lead and brass work is constantly stolen. In the better class of houses, Belgravia, &c., the furniture is of a very valuable description; and, when the wate is left on, the premises are liable to be flooded, causing serious damage. Many of the pipes in the larger houses are built into the walls, and any alterations would involve serious expenditure and risk. Altogether in the Chelsea Company's district, very great difficulty and expense would attend the introduction of constant pressure; and where the inhabitants are acquainted with the subject, they decline to demand the application of the system.

No demand for constant supply has ever been made on the Company.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

The following are the diameters and lengths of the Company's pipes:—

3-inch	24 miles.
4 "	67 "
5 "	53 "
6 "	5 "
7 "	18 "
9 "	8 "
10 "	3 "
12 "	14 "
15 "	8 "
18 "	4 "
24 "	12 "
30 "	8 "
TOTAL	224 miles

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs in case of fire?

The fire-plugs are two inches diameter, and the supply from the first-class mains is from 12,000 to 15,000 gallons per hour; and from second-class mains, half those quantities.

14.—Accounts during the last three years, prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

Section 19.—

Appendix No. 1.

Chelsea Waterworks Company.

Section 19.—" *Accounts of Receipt and Expenditure of Rates, &c., to be prepared and to be open for inspection.*"

ACCOUNT of RECEIPT and EXPENDITURE of all RATES or other MONIES levied under the " Chelsea Waterworks Act, 1852," in the Three Years ending 25th March 1864, 1865, and 1866.

RECEIPTS.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
1864:				1864:			
Water rents	60,699	16	4	Management, office expenses, law charges, &c.	5,525	5	2
Sundry receipts	741	13	8	Rates and taxes	4,701	10	8
				Working expenses	13,412	8	5
				Interest on bond debt, &c.	8,146	18	7
				Dividends	27,480	11	10
				Balance	2,174	15	4
£.	61,441	10	–	£.	61,441	10	–
1865:				1865:			
Water rents	61,162	16	3	Management, office expenses, law charges, &c.	6,831	9	9
Sundry receipts	1,433	8	6	Rates and taxes	4,514	3	8
				Working expenses	12,918	13	10
				Interest on bond debt, &c.	8,206	9	8
				Dividends	29,121	5	10
				Balance	1,004	2	–
£.	62,596	4	9	£.	62,596	4	9
1866:				1866:			
Water rents	64,251	1	–	Management, office expenses, law charges, &c.	6,267	5	1
Sundry receipts	999	11	–	Rates and taxes	4,351	19	4
				Working expenses	13,691	3	6
				Interest on bond debt, &c.	6,485	6	3
				Dividends	32,812	4	6
				Balance	1,642	13	4
£.	65,250	12	–	£.	65,250	12	–

Note.—During the year 1865–66 further capital was raised by the Company, and expended on permanent works.

15.—Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect, or violated by the inhabitants?

The Company have not yet been able to apply the powers under these sections. Great waste of water occurs in the Company's district, and the Company have not thought it advisable to resort to extreme measures, but everything is done by the Company's officers to induce the inhabitants to comply with the requisitions, and in numerous cases they have acceded to the request.

16.—Statement of number of cases annually during the last three years in which water has been cut off under Section 25, with classification of causes?

Section 25.—" *Water may be cut off in certain cases.*"

No houses have been cut off under Section 25 for waste or misuse of water, and very few for non-payment of rents. In fact the Company have acted with the greatest forbearance in applying the powers comprised in Section 25. From continued apprehension of disease in the district it has been considered dangerous to stop any supplies of water.

17.—Regulations made by the Company under Clause 26?

Section 26.—" *Regulations to be made with the approval of the Board of Trade.*"

The Company have not acted under this section.

18.—Average quantity of water supplied daily, during the last year, and also during the years 1856 and 1861, showing the increase of supply.

1856	5,532,000 gallons
1861	5,910,000 „
1866	8,000,000 „

Appendix No. 1.

Chelsea Waterworks Company.

19.—Quantity of water at the source of supply beyond that taken for supply by the Companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

The Thames is of such a large volume at the source of supply (more especially in wet seasons) that seldom less than 600,000,000 gallons per diem is flowing in the stream; and in wet weather the quantity is sometimes ten times that amount and upwards.

20.—Nature and extent of the natural facilities existing for storing water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects. Approximate estimate of expense of any such works?

It is believed that reservoirs could be formed in the upper part of the Thames, to be supplied when the water in the river is abundant, and let out again in dry seasons to augment the flow of the stream; but the Company have no positive information from surveys in this respect. The Conservators of the river have, by the Thames Conservancy Act, 1866, and the pending Conservancy Bill, 1867, taken upon themselves the obligation to protect the water from pollution up to Lechlade in Wilts, and the Company have agreed to pay 1,000 *l.* per annum to them in consideration of such service.

21.—Appropriation of water supplied, as far as can be estimated, under the following or other convenient heads?

(*a.*) For watering the streets, fires, and other similar purposes.

45,459,000 gallons supplied in 1866.

(*b.*) For manufactures, except of drinkable commodities, and for stables and cattle.

The supply for manufactures was 390,000,000 gallons in 1866.

(*c.*) For cleansing water-closets, baths, and other domestic purposes, except for food and drink.

(*d.*) For food and drink.

The supplies under these several heads (*c.* and *d.*), cannot be distinguished, as they are supplied by the same pipes; and after the water enters the houses or premises the Company do not know how the tenants apply it.

22.—Approximate estimates of the future requirements of water supply for the metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

The Thames is a very large river, and the Company consider all the water that can possibly be required in their district can be obtained from it. The area of vacant building ground in the Chelsea Waterworks District is limited, and the erection of new buildings must necessarily progress in a less ratio in a few years than it hitherto has done in that district.

23.—A statement of the several rates and charges which the Company is empowered to make, with a reference to the section and chapter of the Act conferring such powers?

The Company, by the 60th section of "The Chelsea Waterworks Act, 1852," is empowered to charge for water for domestic purposes, according to the annual value of the house, or place supplied, the following rates, viz.:

Where the annual value does not exceed 200 *l.*, a rate not exceeding 4 *l.* per cent. per annum.

Where the annual value exceeds 200 *l.*, a rate not exceeding 3 *l.* per cent. per annum.

The Company is also empowered by the same section of the Act to charge according to the following scale of rates for water-closets, fixed baths, and high service, where the annual value of house shall exceed 30 *l.*:

Annual Value of House or Place supplied.	For a Single Water-closet, Bath, or High Service.	For each Additional Water-closet, Bath, or High Service.
Exceeding 30 *l.*, and not exceeding 50 *l.* - - -	4 shillings -	2 shillings.
„ 50 *l.* „ „ 100 *l.* - - -	6 „ - -	3 „
„ 100 *l.* „ „ 200 *l.* - - -	8 „ - -	4 „
„ 200 *l.* „ „ 300 *l.* - - -	10 „ - -	5 „
Exceeding 300 *l.* - - - - - - -	12 „ - -	6 „

24.—A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases?

The Company's rates and charges are levied and made in accordance with the above section of their Act, *i. e.*, upon the annual value.

There are no drawbacks nor allowances except for "empty rates," which are half rates paid at the option of the owner requiring the water supply to be left on to an empty house, and allowances to owners of small tenements.

Special rates for particular cases: The 63rd section of the Company's Act, 1852, empowers the Company to supply any person or body with water for other than domestic purposes, at such rate and on such terms and conditions as shall be mutually agreed on; such supplies are now almost wholly charged for by quantity to large consumers.

25.—A print of all the local Acts now in force relating to the Company.

"The Chelsea Waterworks Act, 1852."

"The Chelsea Waterworks Act, 1864."

26.—Has any notice been given, or have any measures been taken under Section 67 of the 25 & 26 Vict. c. 102, or under the Sanatory Act of 1866; if so, state the dates, and short particulars thereof.

On the 26th of July 1866, the Company received a requisition under Section 67 of the 25 & 26 Vict. cap. 102, from the Vestry of the parish of St. Luke, Chelsea, to lay on a supply of water to one small house (No. 17, Duke-street, Chelsea), in consequence of the water in a well on the premises having been condemned by the Chelsea medical officer of health. The requisition was complied with immediately. No other request under this Act has been made to the Company.

In Fulham, the attention of the parochial authorities has been called to the fact that certain small tenements in that parish have no water supply, and the Chelsea Waterworks Company understand measures have been, and are being, taken by that parish to enforce such supply.

No notice has been given, or measures taken, under the Sanatory Act of 1866, to the knowledge of the Chelsea Waterworks Company.

Chelsea Waterworks,
27 May 1867.

Albert Gill, Secretary.

Appendix No. 1.

West Middlesex Waterworks Company.

WEST MIDDLESEX WATERWORKS COMPANY.

RETURN of the Company of Proprietors of the West Middlesex Waterworks of Information required from the Water Companies under the "Metropolis Water Act, 1852," for the use of the Committee on the East London Water Bills, &c.

1.—Name of the Company?

The Company of Proprietors of the West Middlesex Waterworks.

2.—Amount of capital in shares and in loans?

	Capital.			
Act of 1852	£. 506,300			– – in 8,300 shares
Ditto	168,604			– – in 2,764 „
„ 1860	67,344			– – in 1,104 „
	£. 742,248			– – in 12,168 shares.
Also raised under Act of 1860 among the proprietors, by scrips at present bearing interest at 5 per cent., but ultimately to become shares	56,323	6	8	
	£. 798,571	6	8	

The Company have no money on loans.

3.—Plan showing the district supplied by the Company, together with the description of district, by the names of the parishes?

Plan will be sent herewith.

4. Extent of the district supplied both by the Company and by any other Company?

The West Middlesex Company supply water in the following parishes, conjointly with other Companies, viz.:

Hampstead	With the New River Company.
St. Pancras	„ ditto
St. Ann's, Soho	„ ditto
St. James, Westminster	„ ditto
St. Marylebone	„ Grand Junction Company.
Paddington	„ ditto
Chiswick	„ ditto
Hammersmith	„ ditto
Kensington	„ ditto, and the Chelsea Company.
Chelsea	„ Chelsea Company.
St. Margaret's, Westminster	„ ditto
Fulham	„ ditto

Also the suburban parishes—

Willesden and Hendon, in which places there is no other Water Company.

5. Number

West Middlesex Waterworks Company.

5.—Number of houses and of inhabitants in district?

The houses supplied by the Company are about - - - -	36,500
Ditto in the district, but not supplied, estimate - - - -	3,000
TOTAL - - -	39,500

Which, estimated at 7 inhabitants per house, will give 276,500 persons.

6. Rateable value of houses?

The Company have no sufficient data to guide them as to the rateable value of all the houses in their district; but estimate that the above 39,500 houses would give a rateable value of about 2,212,000 *l.*

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of water?

The estimated number and value of the houses supplied by the Company are as follows, viz.:

		Houses.
Not exceeding -	£. 20 per annum - -	3,282
From - - - - -	20 to 30 „ - -	8,073
„ - - - - -	30 to 50 „ - -	10,668
„ - - - - -	50 to 100 „ - -	10,507
„ - - - - -	100 to 200 „ - -	3,319
„ - - - - -	200 to 300 „ - -	293
„ - - - - -	300 and upwards - -	358
	£.	36,500

8.—Situation of sources of supply of water; condition of the gathering area?

The Thames above Hampton, about five miles above Teddington Lock. The gathering area is the whole of the Thames above that point.

9.—Situation, extent, and nature of reservoirs, and of filtering beds; length and nature of channels from source of supply to place of distribution?

The subsiding reservoirs are three in number, and are situated at Barnes, Surrey. The aggregate area is 20 ½ acres. Adjoining these reservoirs there are also about eight acres of land: filters in five beds. The channels are 1,000 feet of 48-inch iron conduit from the River Thames to the engine-house wells at Hampton; 8¾ miles of 36-inch iron main from Hampton to the reservoirs at Barnes; and about 220 yards of 36-inch iron conduit from the filters at Barnes, passing under the River Thames to the wells of the distributing engines at Hammersmith.

It will be seen from the next answer that there are other reservoirs for distribution.

10.—Situation, nature, and extent of works and machinery for distribution?

The engines for distribution are situated at Hammersmith, and at Barrow Hill Reservoir, near Primrose Hill, Regent's Park; there are five large single acting engines at Hammersmith of 900 horse-power in the aggregate, and there are two double acting engines at Barrow Hill of 85 horse-power in the aggregate.

The Company have also two covered distributing reservoirs at Kensington and Barrow Hill; that at Kensington being 112 feet above Trinity high-water mark, and containing about 3,672,000 gallons; that at Barrow Hill being 177½ feet above Trinity high-water mark, and containing about 4,750,000 gallons.

The

Appendix No. 1.

West Middlesex Waterworks Company.

The Company are also now constructing another covered reservoir at Kidderpore, in the New Finchley-road at Hampstead, at an elevation of about 310 feet above Trinity high-water mark, which will contain 2,500,000 gallons, with a view to the more efficient supply of the district comprised within their Act of Parliament of 1866.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by or in respect to the Company, to give effect to Clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

Clause 15.—"*Provision for Constant Supply of Water by every Company.*"

The Company's works have been constructed to afford a plentiful and efficient supply of water throughout their district on the intermittent system; and they can also be adapted to the constant system; but the Company are not required by the Metropolis Water Act of 1852 to initiate the constant supply, and they have had no requisition, as provided by that Act, requiring them to give such constant supply. The Directors are of opinion that householders are well satisfied with the existing intermittent system. The constant supply cannot be given under any circumstances without a thorough alteration, revision, and inspection of the present house fittings throughout the district, entailing considerable expense upon the householders. The waste under the intermittent system is very considerable, and the inhabitants are not only disinclined to stop the waste, but in many cases positively refuse to do so.

If the constant system is to be attempted, very stringent regulations must be sanctioned by the Board of Trade with respect to the house-pipes, ball-cocks, cisterns and other receptacles, together with the removal of waste-pipes, taps over sinks, &c. &c., or the waste of water will be considerably increased.

And the Company must be supported in enforcing the penalties for any infringement of the Acts of Parliament.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

The length of the Company's services (exclusive of mains) throughout the district, from which houses are supplied, may be taken as denoting the length of streets, and are as follows, viz.:

2 inch	939 yards.
2½ "	613 "
3 "	85,097 "
4 "	137,486 "
5 "	53,877 "
6 "	40,066 "
7 "	21,386 "

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs in case of fire?

The fire-plugs vary from 2¼ in. to 2½ in. in diameter; the extent of the supply would also vary according to circumstances, the size of the service, and the pressure or head of water; but the principal mains of the Company being always charged under great pressure an abundant supply of water can always be obtained under the present system.

14. Accounts during the last three years prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

Section 19.—"*Accounts of Receipt and Expenditure of Rates, &c., to be prepared and to be open for inspection.*"

Appendix No. 1.

West Middlesex Waterworks Company.

The RECEIPTS and EXPENDITURE for the last Three Years, to the 30th September in each Year, have been as follows, viz.:

30th September 1864.

RECEIPTS.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
Water Rental from all Sources	91,788	4	10	Dividends - - - -	59,469	–	–
				Interest on new Share Capital.	2,690	4	8
				Current Expenses - -	25,624	16	8
				Balance in hand - -	4,004	3	6
£.	91,788	4	10	£.	91,788	4	10

30th September 1865.

RECEIPTS.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
Water Rental from all Sources	96,762	15	11	Dividends - - - -	68,445	–	–
Balance overdrawn - -	521	12	11	Interest on new Share Capital.	696	8	4
				Current Expenses - -	28,143	–	6
£.	97,284	8	10	£.	97,284	8	10

30th September 1866.

RECEIPTS.	£.	s.	d.	EXPENDITURE.	£.	s.	d.
Water Rental from all Sources	100,546	6	3	Dividends - - - -	69,966	–	–
Balance overdrawn - -	568	4	9	Interest on new Share Capital.	2,383	12	8
				Current Expenses - -	28,764	18	4
£.	101,114	11	–	£.	101,114	11	–

15. Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect or violated by the inhabitants?

The Sections 22, 23, and 24 of the Metropolis Water Act of 1852 are generally properly carried out in the first instance when the houses are laid on; but the apparatus gets out of order, and then great waste of water occurs. The Company have not exercised any inquisitorial examination of houses after they are laid on; whenever any examination has been attempted, or whenever, on discovering any waste, notices have been sent to the householder or landlord, they have generally been treated with inattention and neglect, and the Company have been reluctant either to cut off the water or to enforce the penalties. It appears to the Directors the great difficulty of giving a constant supply will be found in the disinclination of the inhabitants to rectify their house-fittings in the first place, and then to submit to all the subsequent inspections and restrictions necessary to prevent continually recurring waste.

16.—Statement of number of cases annually during the last three years, in which water has been cut off under Section 25, with classification of causes.

Section 25.—"*Water may be cut off in certain cases.*"

The number of houses cut off under Section 25 of the Act, during the last three years, has been as follows, viz.:

Cause of Waste.	1864.	1865.	1866.
Defective House Pipes - - - - - - -	71	28	50
Defective Ball-cocks, no Balls, open Pipes, &c. - -	7	6	4
	78	34	54

But no further legal proceedings for recovery of penalties, &c., have been taken under the clause.

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West Middlesex Waterworks Company.

17.—Regulations made by the Company under Clause 26?

Section 26.—"*Regulations to be made with the approval of the Board of Trade.*"

The Company's supply of water being on the intermittent system, it has not been deemed requisite to apply to the Board of Trade under Clause 26, and consequently no regulations, as contemplated by that clause, have been made.

18.—Average quantity of water supplied daily, during the last year, and also during the years 1856 and 1861, showing the increase of supply?

1856:		
Daily average - -	6,005,293 gallons.	
1861:		
Daily average - -	6,716,302 gallons.	Daily increase over 1856: 711,009 gallons.
1866:		
Daily average - -	8,208,168 gallons.	Daily increase over 1861: 1,491,866 gallons.

19.—Quantity of water at the source of supply beyond that taken for supply by the Companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

According to the evidence of the engineer of the Thames Conservancy Board, the general flow of water at Hampton, the point where the Company takes its supply, is 600,000,000 gallons a-day, and in flood times very much greater. The aggregate quantity of water taken by the three Companies at Hampton is about 35,000,000 gallons a-day, leaving a margin of upwards of 560,000,000 of gallons. The minimum of water flowing at Hampton in the driest period of the year (but which only lasts for a short time) has never been known to be less than 400,000,000 gallons.

20.—Nature and extent of the natural facilities existing for storing water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works?

The Company are entitled to take 20,000,000 gallons per day from the river; they have never yet taken more than about 10,000,000 gallons per day. Having, therefore, so large a margin, and knowing what an abundant supply of water there is in the Thames, the Company have not yet made or felt any necessity for making any estimates for storing water to increase the supply.

The five Thames Water Companies did, however, last year, consent to pay 5,000*l.* per annum (in addition to the 1,400*l.* per annum they paid previously) to the Conservators of the Thames, for two purposes, viz.:

1st. To enable the Conservators to repair and improve their navigation works, whereby the head of water in the river will be increased and kept up; and,

2nd. To purify the river by preventing the flow of sewage, &c., into it from all towns and places above where the supply of water for the metropolis is taken.

21.—Appropriation of water supplied, as far as can be estimated under the following or other convenient heads:

(*a.*) For watering the streets, fires, and other similar purposes.

The appropriation of water under the heads suggested in this question cannot be estimated with any satisfactory degree of approximation.

The supply afforded for street watering is believed to be about 51,266,000 gallons per annum; but the quantity supplied at fires, &c., is unknown.

(*b.*) For

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West Middlesex Waterworks Company.

(*b.*) For manufactures, except of drinkable commodities, and for stables and cattle.

	Gallons.
The supply for trades, manufactories, &c. is believed to be about	120,000,000
For flushing sewers	9,000,000
For public baths	22,640,000

But for stables and cattle the quantity is unknown.

(*c.*) For cleansing water-closets, baths, and other domestic purposes, except for food and drink.

The quantity used for cleansing water-closets, private baths, and other domestic purposes, is not known.

(*d.*) For food and drink.

The quantity used for food and drink is not known.

22.—Approximate estimates of the future requirements of water supply for the metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

The Company have not yet deemed it necessary to form any estimates for the future water supply of their district, seeing, as before stated, how large a margin they have, and what an abundant supply of water the Thames is at all times capable of affording. It appears to the Directors that the Company, having been established about 60 years, their present supply of water cannot be more than doubled in the next 50 years; and they form their estimate as follows, viz.: those parts of the parishes of St. Pancras, St. Marylebone, St. James's, Westminster, St. Margaret's, Westminster, and St. Ann's, Soho, which the Company supply, are filled up, and little or no further increase can be expected therein; the suburban parts of the parishes of Paddington, Kensington, Hammersmith, Hampstead, Chelsea, Chiswick, Hendon, and Willesden, may yet be built upon; and may therefore, within the next 50 years, quadruple their present supply of water to those places; so that if, on an average 5,000,000 gallons per day are now required for the town parishes, and 3,000,000 gallons per day for the suburban parishes, the latter quantity may be increased to 12,000,000 gallons per day, equal to an average quantity of 17,000,000 or 18,000,000 gallons per day in the aggregate.

23. A statement of the several rates and charges which the Company is empowered to make, with a reference to the Section and Chapter of the Act conferring such powers?

The West Middlesex Waterworks Company, by their Act of Parliament 15 & 16 Victoria, cap. 159, sections 39 to 45, are empowered to make the several rates and charges following, viz.:

For Ordinary Domestic Supply.

On Annual Value of House—

Not exceeding	200 *l.* at	4 *l.* per cent. per annum.
Above	200 *l.* at	3 *l.* „ „

If service more than 200 feet above Trinity high-water mark, at 1 *l.* per cent. additional.

For Water-closets, High Services, and Baths.

Annual Value of House.	Single Water-closet, High Service, or Bath.	Every additional Water-closet, High Service, or Bath.
Above 30 *l.* to 50 *l.*	4 shillings per annum	2 shillings per annum.
„ 50 *l.* to 100 *l.*	6 „ „	3 „ „
„ 100 *l.* to 200 *l.*	8 „ „	4 „ „
„ 200 *l.* to 300 *l.*	10 „ „	5 „ „
All above 300 *l.*	12 „ „	6 „ „

A supply more than 10 feet above the pavement is deemed high service.

Appendix No. 1.

West Middlesex Waterworks Company.

For Large Consumers.

Low Service—

Quarterly Consumption.	Charge per 1,000 gallons.
From - 25,000 to 50,000 gallons - - - - - -	at Ninepence.
„ 50,000 „ 100,000 „ - - - - - -	at Eightpence.
„ 100,000 „ 200,000 „ - - - - - -	at Sevenpence.
Above 200,000 - - „ - - - - - -	at Sixpence.

High Service.—25 per cent. additional on the above rates.

Note.—The Company are not required to supply less than 25,000 gallons per quarter at the above rates.

24.—A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases?

The Company have generally acted on the foregoing rates and charges; in some cases, however, as for instance where the annual value of the houses is enhanced by reason of their locality for business purposes, as in Oxford-street, the Company do not charge to the full extent; they have also only charged fourpence per 1,000 gallons for public baths and washhouses, without extra rate for high service; instead of sixpence per 1,000 gallons, with extra rate for high service.

25.—A print of all the Local Acts now in force relating to the Company?

All the Company's Acts of Parliament are sent herewith, and are as follows; viz.

46 George 3rd - - -	Cap. 119 - - -	1806
50 George 3rd - - -	„ 132 - - -	1810
53 George 3rd - - -	„ 36 - - -	1813
15 & 16 Victoria - - -	„ 159 - - -	1852
23 Victoria - - - -	„ 1 - - -	1860
29 Victoria - - - -	„ 6 - - -	1866

26.—Has any notice been given, or have any measures been taken, under Section 27 of "The Metropolis Water Act, 1852," or under Section 67 of the 25 & 26 Vict. c. 102, or under Sections 11 and 12 of the Sanitary Act of 1866 (29 & 30 Vict. c. 90); if so, state the dates and short particulars thereof?

The West Middlesex Water Company have not received any notice or requisition under Section 27 of "The Metropolis Water Act, 1852;" nor have they received any notice or requisition under Section 67 of the 25 & 26 Vict. c. 102; nor are they aware of any measures having been taken in their district, under Sections 11 and 12 of "The Sanitary Act, 1866" (29 & 30 Vict. c. 90).

(signed) *W. R. Whiffin*,
Secretary.

West Middlesex Waterworks,
24th May 1867.

Appendix, No. 1.

Grand Junction Waterworks Company.

GRAND JUNCTION WATERWORKS COMPANY.

RETURN of the Grand Junction Waterworks Company of Information required from the Water Companies under the "Metropolis Water Act, 1852," for the use of the Committee on the East London Water Bills, &c.

1.—Name of the Company?

Grand Junction Waterworks Company.

2.—Amount of capital in shares and in loans?

Share capital	- -	700,000 *l.*
Debenture capital	-	150,000 *l.*

3.—Plan showing the district supplied by the Company, together with the description of district, by the names of the parishes?

Plan supplied. The Company's district is bounded on the North by the Great Western Railway; on the East by Poland-street, Windmill-street, and Haymarket; on the South by Pall Mall, Green Park, Hyde Park, Bayswater-road, New-road, Hammersmith and Brentford-road, to Kew Bridge; and on the West by Hounslow, Hanwell, and Hampton Court; it comprises the following parishes, viz.: St. James, Westminster (part of), St. George's, Hanover-square (the inward of), St. Marylebone (part of), Paddington, Kensington (North part of), Hammersmith (part of), Chiswick, Acton, Ealing, New Brentford, Heston, Hounslow, Isleworth, Hanwell, Twickenham, Hampton, Hampton Wick, Teddington, Hampton Court, Bushy Park, Whitton, Hanworth.

4.—Extent of the district supplied both by the Company and by any other Company?

The only portion of the district supplied by the Grand Junction Company, and also by another Company, is a part of Paddington, and a small part of Kensington, in which the West Middlesex Company have pipes also.

5.—Number of houses and of inhabitants in district?

26,902 houses, and
242,118 inhabitants.

6.—Rateable value of houses?

Aggregate annual value upon which the houses are rateable - - 1,918,730 *l.*

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of water?

3,924 houses at and under the annual value of 30 *l.*
21,432 houses of an annual value not exceeding 200 *l.*
1,546 houses exceeding 200 *l.*

8.—Situation of sources of supply of Water, condition of the gathering area?

The source of supply is the River Thames, above Hampton, 5½ miles beyond Teddington Lock.

The gathering area is the watershed of the Thames, above that point.

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Grand Junction Waterworks Company.

9.—Situation, extent, and nature of reservoirs, and of filtering beds; length and nature of channels from source of supply to place of distribution?

At Hampton there are two subsiding reservoirs, of a total area of $2\frac{1}{8}$ acres, and two engines, each of 110-horse power, which pump the water to Kew Bridge, a distance of $7\frac{1}{4}$ miles, through a main of 33 inches diameter.

The reservoirs at the works of distribution at Kew Bridge are $5\frac{3}{4}$ acres in area, and the filter beds $5\frac{1}{6}$ acres. The reservoirs are for the purpose of subsidence, and contain about three days' supply.

10.—Situation, nature, and extent of works and machinery for distribution?

The works of distribution at Kew Bridge comprise the reservoirs and filters described in Answer 9, and also

1 Engine - - - - -	380-horse power.
3 Engines - - - - -	130-horse power each.
1 Engine - - - - -	150-horse power.
TOTAL - - -	920-horse power.

A line of main, 30 inches diameter, leads from the works of distribution to the district, and also supplies a covered reservoir at Campden-hill, Kensington. This reservoir is about 120 feet above T. H. W., and contains 6,000,000 gallons, and is connected with the mains in the district. There are also two engines of 150-horse power each at this point, for the supply of the higher portion of the parish of Paddington by an independent 30-inch main.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by, or in respect to, the Company, to give effect to Clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

Clause 15.—"*Provision for constant supply of Water by every Company.*"

The provision contained in this Clause has not been carried into effect because no requisition has been made to the Company under it. Practically, the supply is constant, if care is taken to provide receptacles of proper size. The area supplied by the Company is furnished with leading mains in most of the principal thoroughfares, and the pressure is regulated to supply the highest cistern in all parts of the district. The carrying this clause into effect would entail laying a series of contour mains, and enforcing upon all the inhabitants supplied a thorough renewal or remodelling of the whole of the pipes, cisterns, fittings, and waterclosets, in accordance with such regulations as must be made with the consent of the Board of Trade, so as to entirely prevent waste.

Additional engine power, service reservoirs, and filters would also be required, as the bulk of the water would be drawn from the mains during a few hours of the day, instead of being equally distributed over the hours of supply, as at present.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

About 140 miles of streets and roads supplied with 220 miles of mains and service pipes, varying from 30 to 3 inches in diameter.

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs in case of fire?

The fire-plugs are 2 inches in diameter. In the leading thoroughfares the district mains are kept constantly charged. The quantity available is dependent on the size of the Companies' main or service pipe in the street, and varies from 7,000 to 10,000 gallons per hour from the principal mains, and from 3,000 to 5,000 gallons per hour from the distributory mains.

14.—Accounts during the last three years prepared in accordance with section 19 of the Act: also showing the dividends and interest paid on capital and loans during the same period.

Section

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Section 19.—" *Accounts of Receipt and Expenditure of Rates, &c., to be prepared and to be open for inspection.*"

Grand Junction Waterworks Company.

Grand Junction Waterworks Company.—An Account of the Receipt and Expenditure, for the Year ending 30th September 1864.

RECEIPTS:	£.	s.	d.	£.	s.	d.
Water rental	-	-	-	67,299	15	5
Amount borrowed	-	-	-	14,500	–	–
Instalments on new shares	-	-	-	16,775	–	–
				98,574	15	5
Deduct balance overdrawn 1st October 1863	-	-	-	1,851	6	10
EXPENDITURE:						
Engines, reservoirs, filter beds, &c.	12,537	19	–			
Extension of district mains and pipes	5,607	–	2			
Law and Parliamentary charges	1,186	13	4			
Repair of works and premises, filter-bed charges, coals, and other working expenses.	9,235	5	4			
Directors', auditors', and officers' salaries, collectors' commission and office charges, and men's wages.	10,528	15	3			
Rents, rates, and taxes	3,909	4	2			
Interest on loans	6,123	1	6			
Dividends	44,462	18	2			
Balance in hand 1st October 1864	3,132	11	8			
£.	96,723	8	7	96,723	8	7

Grand Junction Waterworks Company.—An Account of the Receipt and Expenditure for the Year ending 30th September 1865.

RECEIPTS:	£.	s.	d.	£.	s.	d.
Balance in hand	-	-	-	3,132	11	8
Water rental	-	-	-	77,393	8	6
Amonnt borrowed	-	-		7,000	–	–
Instalments on new shares	-	-	-	39,865	–	–
EXPENDITURE:						
Engines, reservoirs, filter beds, &c.	106	18	–	—		
Extension of district mains and pipes	13,860	7	5	—		
Law and Parliamentary charges	109	17	9	—		
Repair of works and premises, filter bed charges, coals and other working expenses.	10,342	6	4	—		
Directors', auditors' and officers' salaries, collectors' commission, office charges, and men's wages.	11,076	7	4	—		
Rents, rates and taxes	4,534	19	–	—		
Interest on loans	5,558	12	2	—		
Dividends	44,236	14	10	—		
Amount of mortgage bond paid off	16,000	–	–	—		
Balance in hand 1st October 1865	21,564	17	4	—		
£.	127,391	–	2	127,391	–	2

Appendix, No. 1.

Grand Junction Waterworks Company.

Grand Junction Waterworks Company.—An Account of the Receipt and Expenditure for the Year ending 30th September 1866.

RECEIPTS:	£. s. d.	£. s. d.
Balance in hand	- - -	21,564 17 4
Water rental	- - -	75,575 8 6
Amount borrowed	- - -	13,000 – –
Instalments on new shares	- - -	2,555 – –
EXPENDITURE:		
Engines, works, and premises, &c.	9,780 7 9	—
Extension of district mains and pipes	5,430 6 6	—
Law and Parliamentary charges	506 17 8	—
Repair of works and premises, filter bed charges, coals and other working expenses.	10,647 11 10	—
Directors', auditors', and officers' salaries, collectors' commission, office charges, and men's wages.	10,857 10 –	—
Rents, rates, and taxes	3,392 9 1	—
Interest on loans	4,028 15 7	—
Dividends	49,271 8 –	—
Amount of mortgage bonds paid off	16,500 – –	—
Balance in hand 1st October 1866	2,279 19 5	—
£.	112,695 5 10	112,695 5 10

15.—Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect, or violated by the inhabitants?

Section 22.—"Cisterns to be supplied with proper ball-cocks or other apparatus."

The Company insist upon all houses, when laid on, being provided with proper ball-cocks to prevent waste, but from their being frequently taken away or allowed to get out of order, great waste of water is occasioned.

Section 23.—"Cisterns, closets, and baths to be so constructed as to prevent waste or the flow or return of impure matter into the mains, &c."

Although not always in a condition to prevent waste, there are no instances known of any impure matter passing into the mains or service pipes.

Section 24.—"Restricting communication with the pipes of the Company."

This regulation is only violated by the inhabitants in some few cases where branch pipes have been connected with the supply pipes of adjoining houses. This is seldom found to be the case in the better class of property.

16.—Statement of number of cases annually during the last three years in which water has been cut off under Section 25, with classification of causes?

Section 25.—"Water may be cut off in certain cases."

———	1864.	1865.	1866.	TOTAL.
For non-payment of rates	100	183	157	440
By order of the owner as being empty or under repair	49	17	25	91
For waste of water	14	10	10	34
TOTAL	191	296	270	757

17.—Regulations made by the Company under Clause 26?

Section 26.—"Regulations to be made with the approval of the Board of Trade."

No such regulations have been made.

18.—Average

Appendix, No. 1.

Grand Junction Waterworks Company.

18.—Average quantity of water supplied daily, during the last year, and also during the years 1856 and 1861, showing the increase of supply?

1856 - - - Ending Michaelmas, 5,478,361 gallons.
1861 - - - Ending Michaelmas, 7,733,250 gallons.
1866 - - - Ending Michaelmas, 9,317,055 gallons.

19.—Quantity of water at the source of supply beyond that taken for supply by the Companies, using the same source at various seasons of the year, and average of the whole year for the last three years?

There is generally from 600 to 700 millions of gallons of water per day, flowing over Teddington Weir. In wet weather there is a very much larger quantity.

20.—Nature and extent of the natural facilities existing for storing water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works?

Under the Thames Navigation Act, 1866, the Thames Conservancy Board are bound to carry out works for maintaining and improving the purity of the River, for which the Companies have undertaken to pay an annual rent of 5,000 *l.* in addition to the amount they previously paid. Should it be considered necessary at any future time to impound the waters of the Upper Thames, there are natural facilities for carring out the engineering works that would be required for that purpose.

21.—Appropriation of water supplied, as far as can be estimated under the following or other convenient heads:

(*a.*) For watering the streets, fires, and other similar purposes?

In the year 1866, 70,000,000 gallons.

(*b.*) For manufactures, except of drinkable commodities, and for stables and cattle?

168,000,000 gallons for manufactures.

(*c.*) For cleansing water-closets, baths, and other domestic purposes, except for food and drink?*

2,957,266,750 gallons, for cleansing water-closets, baths, and other domestic purposes.

(*d.*) For food and drink?*

It is quite impossible to separate the quantity used for food and drinking from the general domestic supply.

22.—Approximate estimates of the future requirements of water supply for the Metropolis, within the district of the company, for the next 50 years, and of the best means of providing for them?

The Company consider the water in the Thames so large, that it will be fully equal to any increased demand which may possibly be required, for more than the next 50 years.

23.—A statement of the several rates and charges which the Company is empowered to make, with a reference to the section and chapter of the Act conferring such powers?

The rates which this Company are authorised to take, within the limits defined by their Act of 1852 (15 & 16 Vict. clvii.), are thereby settled as follows:—

By section 46 the charge for ordinary supply of water for domestic purposes is—

Where the annual value of the house does not exceed -	£. 200	At a rate per cent. per annum on such value, not exceeding -	£. 4
Exceeding - - - -	£. 200	Ditto - - - ditto - -	£. 3

The

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* The Company have no means of answering the question in its precise terms.

Appendix, No. 1.

Grand Junction Waterworks Company.

The following additional rates are payable for water-closets, fixed baths, or high services:

Annual Value of House.	A Single Watercloset, fixed Bath, or High Service.	Each Additional Watercloset, fixed Bath, or High Service.
Exceeding 30 *l.*, but not exceeding 50 *l.* -	Not exceeding per annum - - 4 *s.*	Not exceeding per annum - - 2 *s.*
„ 50 *l.* „ „ 100 *l.* -	- ditto - - 6 *s.*	- ditto - - 3 *s.*
„ 100 *l.* „ „ 200 *l.* -	- ditto - - 8 *s.*	- ditto - - 4 *s.*
„ 200 *l.* „ „ 300 *l.* -	- ditto - - 10 *s.*	- ditto - - 5 *s.*
Exceeding 300 *l.* - - - - -	- ditto - - 12 *s.*	- ditto - - 6 *s.*

Sect. 49. Agreement as to terms permitted for supplies of water for other than domestic purposes.

Sect. 50. Supplies by meter for other than domestic purposes.

Quarterly Consumption.	Rate per 1,000 Gallons.
Not exceeding - - - - - - 50,000 gallons	9 *d.*
Exceeding 50,000 gallons, and not exceeding 100,000 „	8 *d.*
Exceeding 100,000 „ and „ 200,000 „	7 *d.*
Exceeding - - - - - - - 200,000 „	6 *d.*

And in respect of high-service, an additional 25 *l.* per cent. upon the above rates. The Company not to be required so to supply less than 25,000 gallons in any quarter of a year.

By "The Grand Junction Waterworks Act, 1856," section 4, consumers on the Bishop of London's Paddington Estate are entitled to an abatement of 15 per cent. from the above rates for domestic supply.

By "The Grand Junction Waterworks Act, 1861," section 6, the Company may demand, within the limits of that Act, the same rates as then authorised in like cases within the Company's limits prior to the Act.

24. A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases?

The rates charged are those prescribed; but in few instances are the houses assessed at their full annual value. Landlords of small property are sometimes allowed to compound at a reduction of from 15 to 20 per cent.

Private stables, 5 *s.* per stall per annum; coach houses, 10 *s.* per annum.

Livery stables and large cow-sheds at three-fourths of the above rate.

Road water is sometimes charged by surface watered. Average surface rate, 40 *l.* per mile.

25. A print of all the Local Acts now in force relating to the Company?

These accompany this return.

26. Has any notice been given, or have any measures been taken under Section 27 of "The Metropolis Water Act, 1852," or under Section 67 of the 25 & 26 Vict. c. 102, or under Sections 11 and 12 of the Sanitary Act of 1866 (29 & 30 Vict. c. 90); if so, state the dates and short particulars thereof?

No notice has been given, nor have any measures been taken, under the sections named, of either of the Acts mentioned in this question, within the district of the Grand Junction Waterworks Company.

21 May 1867. *Ernest O. Coe,* Secretary.

Appendix, No. 1.

Southwark and Vauxhall Waterworks Company.

SOUTHWARK AND VAUXHALL WATERWORKS COMPANY.

RETURN of the SOUTHWARK and VAUXHALL WATER COMPANY of Information required from the Water Companies under the "Metropolis Water Act, 1852," for the use of the Committee on the EAST LONDON WATER BILLS, &c.

1.—Name of the Company?

Southwark and Vauxhall Water Company.

2.—Amount of capital in shares and in loans?

	£.
Raised by shares - - - -	685,440
Raised by loans - - - -	415,000

3.—Plan showing the district supplied by the Company, together with the description of district, by the names of the parishes?

PLAN SUPPLIED.

Names of Parishes.

Barnes.
Battersea.
Bermondsey.
Clapham.
Ham.
Mortlake.
Putney.
Petersham.
Richmond.
Wandsworth.

St. Giles, Camberwell.
St. Mary, Newington.
St. Mary, Wimbledon.
St. Mary, Lambeth.
St. Mary, Rotherhithe.
St. Saviour's, Southwark.
St. John's, Southwark.
St. Olave's, Southwark.
St. Thomas, Southwark.
(wholly or partly).

4.—Extent of the district supplied both by the Company and by any other Company?

The only portions of the district supplied by the Southwark and Vauxhall Company, and also by the Lambeth Company, are parts of the parishes of Lambeth, Newington, Camberwell, St. George's, Christchurch, Berdmondsey, and Clapham.

5. Number of houses and of inhabitants in district?

Number of houses in district - -	73,980*
Inhabitants - - - - -	468,540*

6. Rateable value of houses?

Estimated rateable value of houses - £. 1,413,540

7. Number and value above and under 20 *l.*, or other limitation in the Company's Act fixing a different rate of charge for the supply of water?

Number of houses under 20 *l.* - - - -	39,604
Number of houses under 30 *l.* - - - -	16,354
Number of houses under 50 *l.* - - - -	7,302
Number of houses under 100 *l.* - - - -	2,549
Number of houses above 100 *l.* - - - -	721
Large consumers - - - - - -	441

8. Situation

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* Exclusive of those supplied by Lambeth Water Company.

Appendix, No. 1.

Southwark and Vauxhall Waterworks Company.

8. Situation of sources of supply of water; condition of the gathering area?

The source of supply is the River Thames above Hampton, five-and-half miles above Teddington Lock. At Hampton there are two depositing reservoirs; two engines of 110-horse power each, and one of 170-horse power. The gathering area is the watershed of the Thames above that point.

9. Situation, extent, and nature of reservoirs, and of filtering beds; length and nature of channels from source of supply to place of distribution?

The reservoirs and filter beds are at the works of distribution at Battersea. The reservoirs, besides those referred to in answer 8, are 6½ acres in extent, and the filter beds 8¾ acres in area. The reservoirs are for the purpose of subsidence. The reservoirs and filters are connected with the works at the source of supply at Hampton by a line of cast-iron pipes 36 inches diameter and 13¼ miles in length.

10.—Situation, nature, and extent of works and machinery for distribution?

The works of distribution are at Battersea, and comprise the reservoirs and filters described in Answer 9; and also,

1 Engine of 180 horse power	- - -	= 180
2 Engines of 125 „ each	- -	= 250
2 Engines of 160 „ „	- -	= 320
1 Engine of 450 „	- - -	= 450
Total	- - -	1,200 horse power.

The water is pumped for the supply of the eastern portion of the district over a standpipe 186 feet in height, and conveyed to it by means of four mains of 27 inches, 20 inches, and two of 15 inches diameter respectively. The western portion of the district is supplied by engines which pump to a height of 350 feet, through two mains of 15 inches and 12 inches diameter respectively.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by or in respect to the Company, to give effect to Clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

Clause 15.—"*Provision for constant supply of water by every Company.*"

The provision contained in this clause has not been carried into effect, because no requisition has been made to the Company under it. Practically the supply is constant, if care is taken to provide receptacles of proper size. The area supplied by the Company is furnished with leading mains in most of the principle thoroughfares, and the pressure is regulated to supply the highest cisterns in all parts of the district. The carrying of this clause into effect would entail the laying a series of contour mains, and enforcing upon all the inhabitants supplied a thorough renewal or remodelling of the whole of the pipes, cisterns, fittings, and waterclosets, in accordance with such regulations as must be made with the consent of the Board of Trade, so as to entirely prevent waste. Additional engine-power, service-reservoirs, and filters would also be required, as the bulk of the water would be drawn from the main during a few hours of the day, instead of being equally distributed over the hours of supply, as at present.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

About 360 miles of streets and roads supplied with 660 miles of mains and service pipes, varying from 36 inches to 3 inches in diameter.

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs in case of fire?

The fire-plugs are 2 inches in diameter. In the leading thoroughfares the district mains are kept constantly charged. The quantity available is dependent on the size of the Company's main or service pipe in the street, and varies from 7,000 to 10,000 gallons per hour from the principal mains; and from 3,000 to 5,000 gallons per hour from the distributory mains.

14. Account

Appendix, No. 1.

Southwark and Vauxhall Waterworks Company.

14.—Accounts during the last three years prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

Section 19.—"*Accounts of receipt and expenditure of rates, &c., to be prepared and to be open for inspection.*"

RECEIPT and EXPENDITURE of the Southwark and Vauxhall Water Company, from the 1st October 1863 to 30th September 1864.

	£.	s.	d.	£.	s.	d.
Balance at banker's, 1st October 1863	-	-	-	12,251	6	1
Water rates	-	-	-	71,005	13	1
Shares, loans, &c.	-	-	-	101,860	–	–
Paid on account of—						
New works	46,577	15	8			
Extension of service	10,539	7	3			
Law and Parliamentary charges	2,876	13	4			
Repair of works and premises	1,301	2	6			
Pumping establishments	9,153	13	1			
Salaries, wages, collectors' commission, &c.	9,381	9	1			
Rents and taxes	6,033	–	8			
Loans	46,500	–	–			
Interests	14,530	4	4			
Dividends	27,412	17	4			
Balance at bankers', 30th September 1864	10,810	15	11			
£.	185,116	19	2	185,116	19	2

RECEIPT and EXPENDITURE of the Southwark and Vauxhall Water Company, from the 1st October 1864 to 30th September 1865.

	£.	s.	d.	£.	s.	d.
Balance at bankers', 1st October 1864	-	-	-	10,810	15	11
Water rates	-	-	-	75,209	7	10
Shares, loans, &c.	-	-	-	81,794	8	3
Paid on account of—						
New works	54,950	17	9			
Extension of service	12,657	18	5			
Repair of works and premises	1,265	11	10			
Pumping establishments	9,820	9	–			
Salaries, wages, collectors' commission, &c.	11,318	2	1			
Rent and taxes	5,146	5	1			
Loans	21,750	–	–			
Interests	12,347	17	3			
Dividends	31,359	6	–			
Balance at bankers', 30th September 1865	7,198	4	7			
£.	167,814	12	–	167,814	12	–

Appendix, No. 1.

Southwark and Vauxhall Waterworks Company.

Receipt and Expenditure of the Southwark and Vauxhall Water Company, from the 1st October 1865 to 30th September 1866.

	£.	s.	d.	£.	s.	d.
Balance at Banker's, 1st October 1865	-	-	-	7,198	4	7
Water rates	-	-	-	80,310	12	–
Shares, loans, &c.	-	-	-	105,225	–	–
Paid on Account of—						
New works	36,073	7	–			
Extension of services	17,492	15	5			
Law and Parliamentary charges	610	5	–			
Repair of works and premises	1,253	15	8			
Pumping establishments	10,530	–	6			
Salaries of officers, men's wages, collectors' commission, &c.	12,593	16	3			
Rent and taxes	6,477	18	10			
Loans	46,653	10	9			
Interests	14,663	9	9			
Dividends	35,359	12	3			
Balance at Bankers', 30th September 1866	11,025	5	2			
£.	192,733	16	7	192,733	16	7

15.—Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect, or violated by the inhabitants?

Secton 22.—"*Cisterns to be supplied with proper Ball-cocks or other apparatus.*"

The Company require all houses when laid on to be provided with proper ball-cocks to prevent waste, but they are frequently taken away or allowed to get out of order. The regulation is practically inoperative, except in the better class of property.

Section 23.—"*Cisterns, Closets, and Baths to be so constructed as to prevent waste, or the flow or return of impure matter into the mains, &c.*"

Although not always in a condition to prevent waste, there are no instances known of any impure matter passing into the mains or service pipes.

Section 24.—"*Restricting communication with the pipes of the Company.*"

This regulation is only violated by the inhabitants, in some few cases, when branch pipes have been connected with the supply pipes of adjoining houses. This is seldom found to be the case in the better class of property.

16.—Statement of number of cases annually during the last three years in which water has been cut off under Section 25, with classification of causes?

Section 25.—"*Water may be cut off in certain cases*"

Year 1864	64	houses	for non-payment of rates.
Year 1865	69	,,	,, ,,
	27	,,	waste.
Year 1866	51	,,	non-payment of rates.

17. Regulations

Southwark and Vauxhall Waterworks Company.

17.—Regulations made by the Company under Clause 26?

Section 26.—"*Regulations to be made with the approval of the Board of Trade.*"

No such regulations have been made.

18.—Average quantity of Water supplied daily, during the last year, and also during the years 1856 and 1861, showing the increase of supply?

1856	10,331,122 gallons.
1861	11,155,000 gallons.
1866	12,502,000 gallons.

19. Quantity of Water at the source of supply beyond that taken for supply by the Companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

The average summer flow over Teddington Weir daily is said to be between 600 and 700 million gallons. This flow is sometimes (in winter or wet seasons) doubled. The Company have no exact data from which to deduce an average.

20. Nature and extent of the natural facilities existing for storing Water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works?

Under the "Thames Navigation Act, 1866," the Thames Conservancy Board are bound to carry out works for maintaining and improving the purity of the River, for which the companies have undertaken to pay an annual rent of 5,000 *l.*, in addition to the amount they previously paid.

Should it be necessary at any future time to impound the waters of the upper Thames, there are natural facilities for carrying out the engineering works that would be required for that purpose.

21. Appropriation of Water supplied, as far as can be estimated, under the following or other convenient heads:

(*a*) For watering the streets, fires, and other similar purposes.

180,000,000 gallons in 1866.

(*b*) For manufactures, except of drinkable commodities, and for stables and cattle.*

943,000,000 gallons in 1866, for manufactures.

(*c*) For cleansing water-closets, baths, and other domesti purposes, except for food and drink.*

3,439,300,000 gallons in 1866, for cleansing water-closets, baths, and other domestic purposes.

(*d*) For food and drink.*

It is quite impossible to separate the quantity of water used for food and drinking from the general domestic supplies.

22. Approximate estimates of the future requirements of Water supply for the Metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

The Company are about to execute the following works immediately:—

The construction, at Hampton, of two additional deposit reservoirs, with a joint area of four acres, and three filter beds, with a joint area of three acres; the erection of two engines,

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* *N.B.*—The Committee has no data for making these returns as asked; the figures here given are estimated.

Appendix, No. 1.

Southwark and Vauxhall Waterworks Company.

engines, of 200-horse power each; and the laying of an addttional main from Hampton to Wandsworth. These works are intended to supply the western portion of the Company's district; the eastern portion only will then be supplied from the Battersea works; and the surplus filters, engines, &c., at Battersea will be available to meet the growing requirements of the eastern portion of the district, in place of constructing additional filters and engines, which would otherwise be necessary.

The town portion of the Company's district is densely populated, and contains railway stations and manufactories with supplies of a permanent character; and the increase in the next 50 years may be expected chiefly from domestic supplies only in the suburban districts. The Company believe that the existing means at their disposal will meet all requirements for the above-named period.

23. A statement of the several rates and charges which the Company is empowered to make, with a reference to the section and chapter of the Act conferring such powers?

The rates which this Company are authorised to take are defined by their Act of 1852 (15 & 16 Vict. c. clviii), as follows:—

By sect. 53 the charge for ordinary supply of Water for domestic purposes is fixed at a rate per centum per annum on the annual value of the house, not exceeding 5 *l.*

The following additional rates are payable for water-closets, fixed baths, and high services:—

Annual Value of House.	A single Water-Closet, Fixed Bath, or High Service.	Each additional Water-Closet, Fixed Bath, or High Service.
	per annum.	*per annum.*
Exceeding 30 *l.* but not exceeding 50 *l.* - - -	not exceeding 4 *s.*	not exceeding 2 *s.*
„ 50 *l.* „ „ 100 *l.* - - -	not exceeding 6 *s.*	not exceeding 3 *s.*
„ 100 *l.* „ „ 200 *l.* - - -	not exceeding 8 *s.*	not exceeding 4 *s.*
„ 200 *l.* „ „ 300 *l.* - - -	not exceeding 10 *s.*	not exceeding 5 *s.*
Exceeding 300 *l.* - - - - - - -	not exceeding 12 *s.*	not exceeding 6 *s.*

Section 56.—"*Agreement as to terms permitted for supplies of Water for other than domestic purposes.*"

Section 57.—"*Supplies by meter for other than domestic purposes may be given at the following rates:*"

Quarterly Consumption.	Rate per 1,000 Gallons.
	d.
Not exceeding 50 000 gallons - - - -	9
Exceeding 50.000 gallons and not exceeding 100,000 gallons - - - - - -	8
Exceeding 100,000 gallons and not exceeding 200,000 gallons - - - - - -	7
Exceeding 200,000 gallons - - - -	6

And in respect of high service an additional rate, not exceeding 25 *l.* per cent. upon the last-named rates. The Company not to be required so to supply water in any less quantity than 25,000 gallons in any quarter of a year.

24. A statement

Appendix, No. 1.

Southwark and Vauxhall Waterworks Company.

24. A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases?

The rate charged is generally somewhat below the Parliamentary scale.

Where houses under 20 *l.* are compounded for by landlords, an allowance of 20 per cent. is made.

Water for roads is supplied at a surface rate varying from 25 *l.* to 50 *l.* per mile.

25. A print of all the local Acts now in force relating to the Company?

These accompany the present return.

26. Has any notice been given, or have any measures been taken under Section 27 of "Metropolis Water Act, 1852," or under Section 67 of the 25 & 26 Vict. c. 102, or under Sections 11 and 12 of the Sanitary Act of 1866 (29 & 30 Vict. c. 90); if so, state the dates, and short particulars thereof?

The Company are aware that in some few cases in Bermondsey, Rotherhithe, St. Olave's, and St. George's, the parish officers have required landlords to provide additional storage for water, which has thereupon been done.

Except as above, the Company answer this question in the negative.

Charles Robinson,
Secretary.

Appendix, No. 1.

Lambeth Waterworks Company.

LAMBETH WATERWORKS COMPANY.

RETURN of the LAMBETH WATERWORKS COMPANY of INFORMATION required from the Water Companies under "The Metropolis Water Act, 1852," for the use of the Committee on the EAST LONDON WATER BILLS, &c.

1.—Name of the Company?

The Company of Proprietors of Lambeth Waterworks.

2.—Amount of capital in shares and in loans?

	£.
Shares - - - - -	532,130.
Loans - - - - -	204,115.

3.—Plan showing the district supplied by the Company, together with the description of district, by the name of the parishes?

The district supplied by the Company is shown on the accompanying plan, and comprises the following parishes and places:—

Thames Ditton, Esher, Long Ditton, Kingston-upon-Thames, Maldon, Mordon, Wimbledon, Merton, Mitcham, Tooting Graveney, Clapham, Wandsworth, Battersea, Streatham, Croydon, Saint Mary, Newington, Camberwell, Bermondsey, Saint Mary, Lambeth, Saint Saviour, Saint George-the-Martyr, Christchurch, in the county of Surrey, and such part of the parishes of Beckenham and Lewisham as lie on the western side of the River Ravensbourne.

4.—Extent of the district supplied both by the Company and by any other Company?

The portion of the district marked with cross blue lines on the accompanying plan, is also supplied by the Southwark and Vauxhall Company; and the Croydon Local Board of Health have pipes extending over a circle of two miles, from the Town Hall, Croydon, through which they supply the greater part of that district.

5.—Number of houses and of inhabitants in district?

Number of houses supplied - - -	37,203.
Number of inhabitants estimated at -	225,000.

6.—Rateable value of houses?

£. 1,240,822.

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of Water?

	No.	*Value.*
Under £. 20 - -	15,661 - -	£. 210,881
£. 20 and under 40 - -	12,938 - -	338,856
40 and under 60 - -	3,902 - -	186,613
60 and under 80 - -	1,564 - -	106,406
80 and under 100 - -	1,079 - -	96,119
100 and upwards - - -	2,059 - -	301,947

8.—Situation

Lambeth Waterworks Company.

8.—Situation of sources of supply of Water, condition of the gathering area?

The River Thames, at Long Ditton, three miles one furlong above Teddington Lock. The entire stream of the river passes this place, and the gathering area contains all the upper sources of the Thames above the point where the supply is obtained.

9.—Situation, extent, and nature of reservoirs, and of filtering beds, length and nature of channels from source of supply to place of distribution?

The reservoirs and filters are contiguous to the river at Long Ditton, and comprise an area of about four and a half acres. The channel of conveyance is a 30-inch main pipe, 10 miles in length.

10.—Situation, nature, and extent of works and machinery for distribution?

Pumping engines of 970 horse-power are erected at Long Ditton, and convey the Water to reservoirs at Brixton. At Brixton it is pumped by engines of 210 horse-power which deliver the water into reservoirs at Streatham, Selhurst, and Rock Hill. The Kingston District is supplied by a separate main delivering Water into a reservoir at Combe.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all the proceedings and measures taken by, or in respect to the Company, to give effect to Clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

Clause 15.—"*Provision for constant supply of Water by every Company.*"

The Company have been unable to give effect to Clause 15 in the Act to any great extent, on account of the state of the tenants' leaden pipes and brass fittings, which are of a very weak description, and incapable of bearing constant supply; and also on account of the impossibility in the majority of cases of allowing the Water to remain on, from the imperfect drainage and consequent liability to flood and injure property. The constant system of supply in the district is small and restricted; but the Company have about 2,000 houses and premises served direct from the mains; the stop-cocks of these premises are shut off in about three-fourths of them after from three to eight hours' service; in the remaining fourth the supply is left on constantly.

A large portion of the district consists of small houses and cottage property, and the owners and occupiers are averse to any expenditure in repairs and alterations of the pipes and fittings; in numerous instances the lead and brass work is stolen, and it is not found possible to keep the fittings in an efficient state. Taking the entire district, the application of constant supply would involve the landlords and inhabitants in a very large expenditure, probably from 200,000*l.* to 250,000*l.* in the aggregate.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

The pipes connected with the Company's works are as follows:—

3-inch	125 miles.
4 ,,	85 ,,
5 ,,	62 ,,
6 ,,	1 ,,
7 ,,	52 ,,
9 ,,	1 ,,
10 ,,	15 ,,
12 ,,	13 ,,
18 ,,	1 ,,
20 ,,	7 ,,
30 ,,	10 ,,
TOTAL	372 miles.

13.—The dimensions of fire-plugs, and the extent of supply of Water which may be obtained from each class of mains and fire-plugs in case of fire?

The fire-plugs are about two inches in diameter, and yield from 8,000 to 10,000 gallons of Water per hour from the principal mains, and 3,000 to 6,000 gallons per hour from the subsidiary mains.

14.—Accounts

Appendix, No. 1.

Lambeth Waterworks Company.

14.—Accounts during the last three years prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

Section 19.—"*Accounts of receipt and expenditure of rates, &c., to be prepared and to be open for inspection.*"

ACCOUNT of Receipt and Expenditure in the Years 1864, 1865, and 1866; 15 & 16 Vict. c. 84, s. 19.

Receipt.				Expenditure.			
1864:	£.	*s.*	*d.*	1864:	£.	*s.*	*d.*
Water Rents - - -	60,368	17	4	Maintenance of Works, Materials, and Wages, Salaries and Poundage, Office Charges, and other ordinary Annual Expenses.	23,718	2	7
Receipts from other Sources -	388	8	5	Rates and Taxes - - -	3,495	18	11
				Interest on Loans - - -	9,163	10	10
				Dividends - - - -	22,971	14	4
				Balance - - - -	1,407	19	1
£.	60,757	5	9	£.	60,757	5	9
1865:				1865:			
Water Rents - - -	65,471	–	10	Maintenance of Works, Materials, &c., as above.	25,184	13	8
Receipts from other Sources -	379	16	11	Rates and Taxes - . -	4,237	–	4
				Interest on Loans - - -	9,265	11	–
				Dividends - - - -	26,640	7	11
				Balance - - - -	523	4	10
£.	65,850	17	9	£.	65,850	17	9
1866:				1866:			
Water Rents - - -	72,342	15	6	Maintenance of Works, Materials, &c., as above.	28,701	14	8
Receipts from other Sources -	411	14	9	Rates and Taxes - - -	4,329	6	7
				Interest on Loans - - -	9,139	17	10
				Dividends - - - -	29,732	14	8
				Balance - - - -	850	16	6
£.	72,754	10	3	£.	72,754	10	3

15.—Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect, or violated by the inhabitants?

The Company find considerable difficulty in carrying out the requisitions of these sections. Great efforts have been made to stop the waste of Water, but the pipes, cocks, and apparatus are frequently allowed to become out of order, and disinclination is evinced on the part of the inhabitants to rectify defects; they habitually allow the Water to run to waste, to wash out the drains, and hitherto the Company have been unable to prevent the practice. In the poorer districts, the brass cocks and leaden pipes are frequently stolen, as before stated.

16.—Statement of number of cases annually during the last three years in which Water has been cut off under Section 25, with classification of causes?

Section 25.—"*Water may be cut off in certain cases.*"

The Company have acted under this section in comparatively few cases, more especially in the poorer districts, as it has been found most objectionable to stop the supplies of

Water, and the Company's officers have done all in their power to prevail on parties to prevent the necessity of resorting to cutting off the Water. The following is a list of the houses cut off in the years 1864, 1865, and 1866.

YEAR.	Nonpayment.	Waste, &c.	Other Causes.	TOTAL.
1864 - - -	172	280	30	482
1865 - - -	379	215	35	629
1866 - - -	247	330	67	644

The Local Boards and Vestries have expressed their desire so earnestly that supplies of Water should not be cut off or withheld from any inhabitants on account of the cholera, that the Company have forborne to withdraw supplies except in the most urgent cases, and these have been very few.

17.—Regulations made by the Company under Clause 26?

Section 26.—"*Regulations to be made with the approval of the Board of Trade.*"

The Company have not acted under this section.

18.—Average quantity of Water supplied daily, during the last year, and also during the years 1856 and 1861, showing the increase of supply?

1856 - - - 5,391,000 gallons.
1861 - - - 6,557,000 gallons.
1866 - - - 8,950,000 gallons.

19.—Quantity of Water at the source of supply beyond that taken for supply by the Companies using the same source at the various seasons of the year, and average of the whole year for the last three years?

The quantity of Water flowing at the source of supply is usually from 600,000,000 to 700,000,000 gallons per diem, but it is very much larger in wet seasons.

20.—Nature and extent of the natural facilities existing for storing Water and increasing supply during the driest season, or for improving the quality of the supply; and nature of the works required to effect the objects? Approximate estimate of expense of any such works?

The Company are unable to answer this question without an extensive survey and more observations of the flow of Water in the river than they possess. It is worthy, however, of remark that large reservoirs might be constructed on the upper sources of the Thames to store flood waters and discharge their contents into the stream in dry seasons.

With regard to improving the quality of the Water, this duty rests with the Conservators of the River, and the Company have agreed to contribute 1,000 *l.* per annum for this special object.

21.—Appropriation of Water supplied, as far as can be estimated under the following or other convenient heads:

(*a*) For watering the streets, fires, and other similar purposes.

214,641,000 gallons in 1866.

(*b*) For manufactures, except of drinkable commodities, and for stables and cattle.

The supply for manufactures is, as near as it can be estimated, 241,900,000 gallons per annum, but the supplies for stables and cattle are so mixed up with house services that they cannot be ascertained.

(*c*) For cleansing water-closets, baths, and other domestic purposes, except for food and drink.

(*d*) For food and drink.

(*c.* and *d.*) It is not possible to answer these questions, the supplies being afforded by the same pipes and appurtenances for all domestic purposes.

22.—Approximate

Appendix, No. 1.

Lambeth Waterworks Company.

22. Approximate estimates of the future requirements of Water supply for the metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

The Company consider the volume of the Thames so large and the supply so neverfailing, that they are of opinion all the Water required by their district can be obtained from that river. The drainage area into the stream exceeds 2,500,000 acres, and there is a very large quantity of spring water at all times flowing in the catchment ground.

23.—A statement of the several rates and charges which the Company is empowered to make, with a reference to the section and chapter of the Act conferring such powers?

Under the 37th section of the Lambeth Waterworks Act, 1848 (11 Vict. c. 7), the Company is to furnish supplies of Water for domestic uses at the following rates:—

Annual Value of House.	Rate per Centum per Annum.		
	£.	s.	d.
Not exceeding 20 *l.* - - - - - -	7	10	–
Exceeding 20 *l.*, and not exceeding 40 *l.* - -	7	–	–
„ 40 *l.* „ „ 60 *l.* - -	6	10	–
„ 60 *l.* „ „ 80 *l.* - -	6	–	–
„ 80 *l.* „ „ 100 *l.* - -	5	10	–
„ 100 *l.* - - - - - -	5	–	–

ADDITIONAL FOR WATER CLOSETS.

Annual Value of House.	For Single Water Closet per Annum.			Each Additional Water Closet per Annum.		
	£.	s.	d.	£.	s.	d.
Exceeding 20 *l.*, and not exceeding 40 *l.*	–	10	–	–	5	–
„ 40 *l.* „ „ 60 *l.*	–	12	–	–	6	–
„ 60 *l.* „ „ 100 *l.*	–	15	–	–	7	6
„ 100 *l.* - - - - -	1	–	–	–	10	–

24.—A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases?

The rates are charged according to circumstances. In the thickly populated and lower districts they are under the maximum charges in the Act; in the higher and more thinly populated districts the maximum rates are frequently charged.

There are no drawbacks nor allowances, except for empty rates, which are half-rates paid at the option of the owner requiring the Water supply to be left on to an empty house, and allowances to owners of small tenements.

By Section 38 of the Company's Act of 1848, the Company are authorised to supply Water for other than domestic purposes, upon such terms and conditions as shall be mutually agreed upon. Such supplies are charged for by quantity to large consumers.

25.—A print of all the Local Acts now in force relating to the Company?

Prints of the Acts of the Lambeth Waterworks Company now in force are left herewith.

26.—Has any notice been given, or have any measures been taken under Section 27 of "The Metropolis Water Act, 1852," or under Section 67 of the 25 & 26 Vict. c. 102, or under Sections 11 and 12 of the Sanitary Act of 1866 (29 & 30 Vict. c. 90); if so, state the dates and short particulars thereof?

The Company have had occasional inquiries from parochial officers, as to whether the Company were willing to supply certain small properties on the terms specified in Section 27 of "The Metropolis Water Act, 1852," 25 & 26 Vict. c. 102, and the Company have done what they could to extend supplies of water to such properties, by adapting their charges to the special cases. Many houses, probably 1,000, have been laid on in the Lambeth Water Company's district, but the number cannot be accurately stated, as many houses have been laid on by ordinary applications.

The Company are not aware of any action having been taken under Section 67 of the 25 & 26 Vict. c, 102, or under Sections 11 and 12 of the Sanitary Act of 1866, 29 & 30 Vict. c. 90.

31 May 1867.

W. S. Phipps,
Secretary, Lambeth Waterworks Company.

Appendix, No. 1.

Kent Waterworks Company.

KENT WATERWORKS COMPANY.

REPLIES to Questions from the Committee to the Kent Waterworks Company.

1.—Name of the Company?

Kent Waterworks Company.

2.—Amount of capital in shares and in loans?

	£.
Stock - - - -	447,240.
Loans - - - - -	42,000.

3.—Plan showing the district supplied by the Company, together with the description of district, by the names of the parishes?

The Company's district includes the following parishes and liberties:—

St. Paul, Deptford; St. Nicholas, Deptford; Greenwich, Woolwich, Charlton, Lee, Plumpstead, Eltham, Bromley, Crayford, Dartford, Bexley, Erith, Chiselhurst, Mottingham, Kidbrooke, and parts of the parishes of Lewisham, Camberwell, and Rotherhithe.

4.—Extent of the district supplied by the Company and by any other Company?

No part of the Company's district is jointly in supply with any other Company.

5.—Number of houses and inhabitants in district?

The Company supplied on 25th December 1866 - - -	33,864 houses.
Number of inhabitants estimated at - - - - -	237,068

6.—Ratcable value of houses?

The annual value of the houses supplied is (exclusive of public establishments and premises supplied by meter) 675,329 *l.*

7.—Number and value above and under 20 *l.*, or other limitation in the Company's Act, fixing a different rate of charge for the supply of water?

	£.	£.
Houses of annual value not exceeding - -	20 per annum - -	23,303
Above £. 20 and not exceeding - - -	30 „ - - -	5,001
„ 30 „ „ - - -	50 „ - - -	3,599
„ 50 „ „ - - -	100 „ - - -	1,001
„ 100 - - - - - -	- - - - - -	788
Meter supplies - -	- - - - - -	172
	£.	33,864

8.—Situation of sources of supply of water; condition of the gathering ground?

The Company obtain their water supply wholly from artesian wells sunk into the chalk at the following places:—Deptford, Charlton, Plumpstead, Bromley, and Crayford.

Appendix, No. 1.

Kent Waterworks Company.

9.—Situation, extent, and nature of reservoirs and of filtering beds; length and nature of channels from source of supply to place of distribution?

The Company has the following summit reservoirs:—

Covered Reservoirs:

Woolwich Common - - - - -	capacity	325,000 gallons.
Plumstead Common - - - - -	„	750,000 „
Chiselhurst Common - - - - -	„	450,000 „

Uncovered Reservoirs:

Greenwich Park - - - - - -	capacity	1,125,000 gallons.
Woolwich Common - - - - -	„	1,600,000 „

These last two reservoirs are in connection with the naval and military establishments at Woolwich, Deptford, and Greenwich, by a series of special mains, for protection from fire.

The filters and deposit reservoirs, formerly in use, were abandoned on the change of supply from the river Ravensbourne to the chalk springs.

10.—Situation, nature, and extent of works and machinery for distribution?

The Company's works are situated at Deptford, Charlton, Plumstead, Bromley, Crayford, and in the Dover-road, near Shooter's Hill.

The Deptford Station:

Two engines,	single-acting cylinders,	70 in.	diameter,	10 ft.	0 in.	stroke.
One	„	„ 60	„	10	0	„
Two	„	„ 38	„	6	3	„
One	„	„ 30	„	8	0	„
One	„	„ 26	„	4	0	„

Charlton Station:
Two engines, single acting cylinders, 60 in. diameter, 10 ft. stroke.

Plumstead Station:
One engine, double-acting cylinder, 29 in. diameter, 3 ft. stroke.

Bromley Station:
One engine, single-acting cylinder, 40 in. diameter, 8 ft. stroke.

Crayford Station:
One engine, double-acting cylinder, 24 in. diameter, 4 ft. stroke.

Dover Road Station:
Two engines, double-acting cylinders, 20 in. diameter, 3 ft. stroke.

These engines could lift and distribute double the Company's average daily supply.

11.—Nature of arrangements made for constant supply, number of houses so supplied, and the particulars of all proceedings and measures taken by or in respect to the Company to give effect to Clause 15 of the Act, and the views of the Company as to the best mode of carrying the same into effect?

The Company, by the provision of additional summit reservoirs and increase of steam power, have made on their part every provision necessary to give effect to Clause 15 of the Metropolis Water Supply Act.

No application, under the Act, has been made for a constant supply, but there would be in this Company's district no difficulty in an immediate adoption of this mode of water service, provided the Sections 15, 22, 23, 24, 25, and 26 were carried into effect.

Constant service is given to the Government naval and military establishments at Woolwich and Deptford, and to manufacturers and others by meter.

12.—Statement showing the length of streets supplied with service pipes of different dimensions?

The pipeage of the Company is 211 miles, the diameters from 1½ to 24 inches.

13.—The

Appendix, No. 1.

Kent Waterworks Company.

13.—The dimensions of fire-plugs, and the extent of supply of water which may be obtained from each class of mains?

The fire-plug pipes have conical openings, the lesser diameter being 2½ inches. The water supply, both from mains and plugs, will vary in quantity with the elevation of streets in which they are placed, and with the extent of supply which the public, at the time, may be receiving. In a district like that of the Kent Waterworks, with constantly varying levels of ground from high-water mark to 440 feet above it, it is impossible to reply correctly to this question.

14.—Accounts during the last three years, prepared in accordance with Section 19 of the Act; also showing the dividends and interest paid on capital and loans during the same period?

YEAR ENDING CHRISTMAS, 1864.

	£.	s.	d.	£.	s.	d.
RECEIPTS.						
Water rates - - - - - - - - - -	39,418	15	6			
Other sums, including new capital subscribed under the powers of the Company's Act - - - - - -	30,173	13	10			
				69,592	9	4
EXPENDITURE.						
Expenses chargeable to revenue - - - - - -	17,665	3	1			
New works and extensions - - - - - - -	27,097	5	7			
				44,762	8	8
Balance - - - £.				24,830	–	8

Dividend 6 *l.* per cent. Interest on loans 4 *l.* 16*s.* per cent.

YEAR ENDING CHRISTMAS, 1865.

	£.	s.	d.	£.	s.	d.
RECEIPTS.						
Water rates - - - - - - - - - -	41,752	4	3			
Other sums, including new capital subscribed under the powers of the Company's Act - - - - - -	26,159	16	8			
				67,912	–	11
EXPENDITURE.						
Expenses chargeable to Revenue - - - - - -	19,943	5	9			
New works and extensions - - - - - - -	23,566	6	–			
				43,509	11	9
Balance - - - £.				24,402	9	2

Dividend 6 *l.* per cent. Interest on loans 4 *l.* 16 *s.* per cent.

YEAR ENDING CHRISTMAS, 1866.

	£.	s.	d.	£.	s.	d.
RECEIPTS.						
Water rates - - - - - - - - - -	44,584	13	11			
Other sums, including new capital subscribed under the powers of the Company's Act - - - - - -	18,204	7	9			
				62,789	1	8
EXPENDITURE.						
Expenses chargeable to Revenue - - - - - -	19,915	2	8			
New works and extensions - - - - - - -	17,144	1	3			
				37,059	3	11
Balance - - - £.				25,729	17	9

Dividend 6 *l.* per cent. Interest on loans 4 *l.* 16*s.* per cent.

The dividends and interest on loans are paid from the profits; the cost of new works from capital.

15.—Statement

Appendix, No. 1.

Kent Waterworks Company.

15.—Statement of the extent to which Sections 22, 23, and 24 of the Act are carried into effect or violated by the inhabitants?

Constant supervision by specially appointed servants is found necessary to ensure a compliance with Clauses 22 and 23, to enforce the restoration of ball-cocks and taps, and to prevent waste. No difficulty is experienced in preventing the flow or return of foul air, &c., to the mains.

16.—Statement of number of cases during the last three years in which water has been cut off under Section 25, with classification of causes?

The instances of a necessity for cutting off water under Section 25 are very rare, and no record has been kept of them; in no instance has there been a removal of supply for more than a few days.

17.—Regulations made by the Company under Clause 26?

None.

18.—Average quantity of water supplied daily during the last year, and also during the years 1856 and 1861, showing the increased supply?

1856 - -	- 2,680,000 gallons.	
1861 - -	- 4,920,000 „	- - 2.340,000 increase.
1866 - -	- 6,150,000 „	- - 1,230,000 „

19.—Quantity of water at the source of supply, beyond that taken for supply, by the Companies using the same source at the various seasons of the year; and average of the whole year, for the last three years?

The supply obtainable from the Company's artesian wells is greatly in excess of the requirements of the Company, but to what extent has not been ascertained.

20.—Nature and extent of the natural facilities existing for storing water, and increasing supply during the driest season, and nature of the works required to effect the object? Approximate estimate of expense of any such work?

The Company's existing wells are equal to all emergencies.

21.—Appropriation of water supplied, as far as can be estimated, under the following or other convenient heads:

(*a*) For watering streets, fires, and other similar purposes?

(*b*) For manufactures, except of drinkable commodities, and for stables and cattle?

(*c*) For cleansing water closets, baths, and other domestic purposes, except for food and drink?

(*d*) For food and drink?

The quantity of water supplied during the year 1866, to roads, &c., and to manufactures, was as under:

(*a*) Road-watering, flushing, and fires - - -	69,500,000 gallons.
(*b*) Manufactures - - - - - -	64,000,000 „
(*c*) Domestic uses (*d*) Food and drink - - - - - -	- 1,666,795,000 „

No reliable separation can be made of the inquiries (*c*) and (*d*).

22.—Approximate estimates of the future requirements of water supply for the metropolis, within the district of the Company, for the next 50 years, and of the best means of providing for them?

From 1840 to 1866, the annual demand for water in the Kent Water Works District has been doubled at the respective intervals of six, four, seven, and nine years; the present consumption, in round numbers, being 16 times greater than in 1840; it can hardly be assumed that for a further period of 50 years this rate of increase will be maintained, yet there is within the area of the Company's district an ample supply to be obtained, equal to such a demand, should it arise.

23.—A statement

Appendix, No. 1.

Kent Waterworks Company.

23.—A statement of the several rates and charges which the Company is empowered to make, with a reference to the Section and Chapter of the Act conferring such powers?

KENT WATER WORKS ACT, 1864.

Sections 28 and 30. For domestic purposes, as defined in Section 29.

Yearly Value of Premises.			Rate, including one Water Closet.			Second Water Closet.	All others, each.	First Bath.	All others, each.
£.		£.	£.	s.	d.	s.	s.	s.	s.
	Not exceeding	7	–	8	–	5	5	6	6
Exceeding 7	and not exceeding	8	–	9	6	,,	,,	,,	,,
,, 8	,,	9	–	10	6	6	,,	8	,,
,, 9	,,	10	–	12	–	,,	,,	,,	,,
,, 10	,,	11	–	13	–	,,	,,	,,	,,
,, 11	,,	12	–	14	–	,,	,,	,,	,,
,, 12	,,	13	–	15	6	,,	,,	,,	,,
,, 13	,,	14	–	16	6	,,	,,	,,	,,
,, 14	,,	15	–	18	–	,,	,,	,,	,,
,, 15	,,	16	–	19	–	,,	,,	,,	,,
,, 16	,,	17	1	–	–	,,	,,	,,	,,
,, 17	,,	18	1	1	6	,,	,,	,,	,,
,, 18	,,	19	1	2	6	,,	,,	,,	,,
,, 19	,,	20	1	4	–	,,	,,	,,	,,
,, 20	,,	25	1	8	–	7	,,	10	,,
,, 25	,,	30	1	11	–	,,	,,	,,	,,
,, 30	,,	35	1	15	–	,,	,,	,,	,,
,, 35	,,	40	2	–	–	,,	,,	,,	,,
,, 40	,,	45	2	5	–	,,	,,	,,	,,
,, 45	,,	50	2	10	–	,,	,,	,,	,,
,, 50	,,	60	2	15	–	,,	,,	,,	,,
,, 60	,,	70	3	3	–	8	,,	,,	,,
,, 70	,,	80	3	10	–	,,	,,	,,	,,
,, 80	,,	95	3	16	–	,,	,,	12	,,
	Exceeding 95		4 per cent. on annual value.			10	,,	,,	,,

Supplies by Meter by agreement.

24.—A statement of the rates and charges actually made by the Company, and of all drawbacks, allowances, or special rates for particular cases?

The Company's charges do not exceed the scale allowed by the Act, in many cases they are below; there are no special rates for particular cases.

25.—A print of all the Local Acts now in force relating to the Company?

Kent Water Works Act, 1809.
Kent Water Works Amendment Act, 1811.
Kent Water Works Amendment Act, 1850.
Kent Water Works Act, 1862.
Kent Water Works Act, 1864.

Appendix, No. 2.

Appendix, No. 2.

Acts of Parliament relating to the Water Companies.

New River Company:
- 15 & 16 Vict. c. 160.
- 17 Vict. c. 39.
- 17 Vict. c. 72.
- 20 & 21 Vict. c. 42.
- 29 & 30 Vict. c. 230.

East London Waterworks:
- 16 & 17 Vict. c. 166.
- 17 Vict. c. 65.
- 18 & 19 Vict. c. 196.
- 25 Vict. c. 22.

Chelsea Waterworks:
- 15 & 16 Vict. c. 156.
- 27 & 28 Vict. c. 39.

West Middlesex:
- 46 Geo. 3, c. 119.
- 50 Geo. 3, c. 132.
- 53 Geo. 3, c. 36.
- 15 & 16 Vict. c. 159.
- 23 Vict. c. 1.
- 29 Vict. c. 6.

Grand Junction Waterworks:
- 7 Geo. 4, c. 140.
- 5 & 6 Gulielm. 4, c. 95.
- 7 & 8 Vict. c. 30.
- 15 & 16 Vict. c. 157.
- 18 Vict. c. 21.
- 19 & 20 Vict. c. 116.
- 24 & 25 Vict. c. 151.

Vauxhall and Southwark Water Company:
- 8 & 9 Vict. c. 69.
- 15 & 16 Vict. c. 158.
- 18 Vict. c. 24.
- 27 Vict. c. 8.
- 30 Vict. c. 5.

Lambeth Waterworks:
- 11 Vict. c. 7.
- 19 Vict. c. 10.

Kent Waterworks:
- 49 Geo. 3, c. 189.
- 51 Geo. 3, c. 145.
- 13 & 14 Vict. c. 59.
- 25 Vict. c. 44.
- 27 & 28 Vict. c. 146.

Table No. 1.—General Properties of the Waters supplied by the Metropolitan Water Companies in 1867, before and after Filtration at the Works.

—	From Thames at Waterworks above Hampton.	West Middlesex (Thames).		Grand Junction (Thames).		Southwark and Vauxhall (Thames).		Lambeth (Thames).		Chelsea (Thames).		New River (Lea Springs and Wells).		East London (Lea).	
		Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.
Date when taken	Feb. 16, 1867.	Jan. 26, 1867.	Jan. 29, 1867.	Feb. 2, 1867.	Feb. 5, 1867.	Feb. 9, 1867.	Feb. 11, 1867.	Dec. 1, 1866.	Dec. 8, 1866.	Dec. 1, 1866.	Dec. 8, 1866.	Jan. 19, 1867.	Jan. 21, 1867.	Jan 12, 1867.	Jan. 14, 1867.
Hardness (degrees)	14· 5	13· 0	13· 2	13· 5	13· 0	14· 3	13· 2	15· 5	13· 5	15· 5	13· 5	13· 5	13· 0	14· 4	14· 0
Hardness after boiling	4· 8	4· 8	4· 0	5· 0	5· 0	5· 5	5· 2	5· 8	4· 3	5· 6	4· 6	4· 2	4· 0	5· 0	5· 0
Dissolved Gases, per gallon (cub. in.)	13·70	13·50	13·54	12·99	12·81	13·00	14·95	14·63	13·93	14·71	14·00	13·95	12·75	12·51	13·75
Consisting of (per cent.) Carbonic Acid	46·85	34·58	46·12	38·69	42·58	46·92	37·79	48·16	38·26	49·67	41·90	41·21	35·29	37·50	41·82
Oxygen	15·75	19·58	16·97	16·76	16·41	15·39	16·72	16·36	18·91	16·46	18·11	19·00	20·78	20·83	15·99
Nitrogen	37·40	45·84	36·91	44·55	41·01	37·69	45·49	35·48	42·83	33·87	39·99	39·79	43·93	41·67	42·19
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100 00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Oxygen required to oxydise—															
(*a*) Nitrate and Protosalt Iron	0·070	0·000	0·000	0·100	0 030	0·070	0·050	0·000	0·070	0·000	0·000	0·000	0·000	0·000	0·017
(*b*) Organic Matter	0·110	0·115	0·075	0·125	0·135	0·100	0·110	0·110	0·095	0·110	0·105	0·115	0·069	0·090	0·078
Total per gallon (grs.)	0·180	0·115	0·075	0·225	0·165	0·170	0·160	0·110	0·165	0·110	0·105	0·115	0·069	0·090	0·095
Oxygen dissolved in the water (grs.)	0·738	0·904	0·786	0·745	0·719	0·684	0 855	0·819	0·901	0·828	0·867	0·906	0·906	0·891	0·752
Ammonia, per gallon (grs.)	0·003	0·003	0·001	0·003	0·002	0·002	0·002	0·003	0·002	0·005	0·002	0·001	0·001	0·004	0·003

GENERAL RESULTS.	Thames Companies.		New River.		East London.	
	Unfiltered.	Filtered.	Unfiltered.	Filtered.	Unfiltered.	Filtered.
Hardness before boiling (degrees)	14· 4	13· 3	15· 5	13· 5	14· 4	14· 0
Hardness after boiling (degrees)	5· 3	4· 6	4· 2	4· 0	5· 0	5· 0
Dissolved Gases, per gallon (cubic inches)	13· 77	13· 85	13· 95	12· 75	12· 51	13· 75
Dissolved Oxygen, per gallon (grains)	0·796	0·825	0·906	0.906	0·891	0·752
Oxygen required to oxydise Organic and other Matter (grains)	0·146	0·134	0·115	0·069	0·090	0·095
Ammonia, per gallon (grains)	0·003	0·002	0·001	0·001	0·004	0·003

All the samples of Filtered Water drawn from the Mains were clear, and when examined in a glass tube two feet in length, they had only a very pale greenish yellow tinge. Judging from this, and from the small amount of oxygen required to oxydise the organic matter, it could not in any case have exceeded a grain per gallon of water, or 1 part in 70,000 parts.

The proportion of ammonia was also very small, the range being from the 1-1000th of a grain per gallon of water, to the 4-1000th of a grain per gallon; that is, from 1 part of ammonia in 70 million parts of water to 1 part in 17½ millions.

Table No. 2.—ANALYSES of the WATERS supplied by the METROPOLITAN WATER COMPANIES in 1867, before and after FILTRATION at the WORKS.

	Thames, at Waterworks above Hampton.	West Middlesex (Thames).		Grand Junction (Thames).		Southwark and Vauxhall (Thames).		Lambeth (Thames).		Chelsea (Thames).		New River (Lea, Springs and Wells).		East London (Lea).	
		Unfiltered from Works.	From Mains.	Unfiltered from Works.	From Mains.	Unfiltered from Works.	From Mains.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.	Unfiltered from Works.	From Main.
Date when taken	Feb. 16, 1867.	Jan. 26, 1867.	Jan. 29, 1867.	Feb. 2, 1867.	Feb. 5, 1867.	Feb. 9, 1867.	Feb. 11, 1867.	Dec. 1, 1866.	Dec. 8, 1866.	Dec. 1, 1866.	Dec. 8, 1866.	Jan. 14, 1867.	Jan. 21, 1867.	Jan. 12, 1867.	Jan. 14, 1867.
	Grs.	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*
Lime	8·710	8·093	8·664	8·030	8·070	8·273	8·213	8·653	7·142	8·644	7·273	8·104	9·129	10·533	10·300
Magnesia	0·548	0·445	0·475	0·705	0·728	0·529	0·525	0·448	0·468	0·566	0·551	0·530	0·449	0·592	0·543
Potassa	0·432	0·451	0·368	0·472	0·421	0·455	0·373	0·399	0·452	0·435	0 381	0·290	0·397	0·454	0·434
Soda	1·035	1·003	0·858	1·190	1·084	0·960	1·204	0·975	1·212	0·952	1·204	0·876	0·825	1·006	1·137
Ammonia	0·003	0·003	0·001	0·003	0·002	0·002	0·002	0·003	0·002	0 005	0·002	0·001	0·001	0·004	0 003
Iron and Alumina	0·073	0·126	0·004	0·298	0·168	0·160	0 087	0·018	0·331	0·038	0·180	0 203	0·029	0·205	0·068
Carbonic Acid	5·357	5·305	5·493	4·746	4·996	5·202	5·111	5·831	4·868	5·797	4·306	7·485	6·165	7·164	6·883
Sulphuric Acid	1·130	0·990	0·930	1·640	1·540	1·500	1·510	1·060	1·440	1·510	1·510	0·810	0·790	1·610	1 650
Nitric Acid	0·731	0·989	0·864	0·724	0·768	0·800	0·847	0·916	0·754	0·918	0·892	0·684	0·790	0·800	0·796
Chlorine	0·990	0·980	0·980	1·060	1·020	1·050	1·000	1·020	1·020	1·100	1·030	0·950	0·950	1·220	1·100
Silica	0·253	0·440	0·113	0·493	0·453	0·440	0·480	0·730	0·331	0·544	0·456	0·768	0·702	0·490	0·747
Total	19·262	18·825	18·750	19·361	19·250	19·371	19·352	20·053	18·020	20·509	17·785	20·701	20·227	24·078	23·661
From which the Oxygen equivalent of Chlorine is to be deducted	0·220	0·218	0·218	0·234	0·227	0·233	0·222	0·227	0·227	0·244	0·229	0·211	0·211	0·271	0·244
Total Saline Matter, per gallon	19·042	18·607	18·532	19·127	19·023	19·138	19·130	19·826	17·793	20·265	17·556	20·490	20·016	23·807	23·417
Organic and other Volatile Matter determined by Incineration	0·892	1·327	0·462	1·497	1·188	1·078	1·010	1·217	1·235	1·187	0·985	0·702	0·567	0·915	0·300
Total Solid Matter obtained by Analysis	19·934	19·934	18·994	20·624	20 211	20·216	20·140	21·043	19·028	21·452	18 541	21·192	20·583	24·722	23·717
Ditto - ditto by Evaporation	20·577	19·830	19·683	20·862	19·968	20·833	20·024	21·425	18·783	21·173	18·937	22·402	21·550	24·940	24·360
Suspended Matter - Organic	0·140	0·101	0·009	0·275	0·000	0·201	0·005	0·100	0·005	0·186	0 007	0·033	0·014	0·045	0·023
Suspended Matter - Mineral	1·089	0·415	0·028	1·304	0·005	1·086	0·019	0·224	0·038	0·260	0·053	0·208	0·081	0·516	0·024
Total per Gallon	1·229	0·516	0·037	1·579	0·005	1·287	0·024	0·324	0·043	0·446	0·060	0·241	0·095	0·561	0·047

GENERAL RESULTS.

	Thames Companies.		New River.		East London.	
	Unfiltered.	Filtered.	Unfiltered	Filtered.	Unfiltered.	Filtered.
	Grs.	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*
Dissolved Matter, per gallon	20·825	19·479	22·402	21·550	24·940	24·360
Of which Organic and other Volatile Matter	1·261	0·976	0·702	0·567	0·915	0·300

1865 and 1866.	Solid Matter, per Gallon.								Organic and other Volatile Matter Determined by Incineration.								Oxygen required to Oxydise Organic and other Matter, per Gallon.							
	West Middlesex (Thames).	Grand Junction (Thames).	Southwark and Vauxhall (Thames).	Lambeth (Thames).	Chelsea (Thames).	New River (Lea, Springs and Wells).	East London (Lea).	Kent (Chalk Wells).	West Middlesex (Thames).	Grand Junction (Thames).	Southwark and Vauxhall (Thames).	Lambeth (Thames).	Chelsea (Thames).	New River (Lea, Springs and Wells).	East London (Lea).	Kent (Chalk Wells).	West Middlesex (Thames).	Grand Junction (Thames).	Southwark and Vauxhall (Thames).	Lambeth (Thames).	Chelsea (Thames).	New River (Lea, Springs and Wells).	East London (Lea).	Kent (Chalk Wells).
	Grs.	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*
January - -	21·32	20·95	20·73	20·78	21·39	19·28	23·02	25·41	1·55	1·57	1·74	1·45	0·92	1·20	1·73	1·17	0·076	0·095	0·079	0·114	0·118	0·047	0·067	0·026
February - -	21·28	21·09	22·65	20·97	22·10	19·95	22·95	24·44	1·75	1·53	1·79	1·74	2·00	1·20	1·21	1·40	0·073	0·085	0·085	0·101	0·075	0·060	0·072	0·031
March - - -	20·36	20·99	20·76	20·39	20·14	20·57	22·52	25·24	1·55	1·50	1·54	1·73	1·48	1·43	1·66	1·58	0·090	0·070	0·081	0·091	0·114	0·045	0·076	0·030
April - - -	18·71	20·43	19·35	19·00	19·19	18·35	20·65	27·11	1·26	1·31	1·31	1·70	1·19	1·08	1·49	1·21	0·075	0·045	0·058	0·060	0·069	0·046	0·058	0·031
May - - -	18·94	19·10	18·53	18·40	19·18	16·82	19·24	25·66	1·57	1·04	1·50	1·57	1·38	0·98	1·04	1·35	0·058	0·040	0·079	0·069	0·067	0·039	0·059	0·018
June - - -	18·02	18·05	18·81	18·60	18·96	16·13	18·25	27·01	0·71	0·67	1·02	0·80	1·18	0·93	1·25	1·25	0·050	0·078	0·081	0·090	0·080	0·049	0·054	0·010
July - - -	16·97	17·50	17·15	18·04	17·55	16·73	17·83	27·28	0·80	1·22	0·92	1·08	1·26	0·94	1·01	1·57	0·095	0·077	0·071	0·085	0·078	0·023	0·044	0·021
August - - -	16·80	17·51	17·93	16·98	17·71	16·29	16·99	25·78	0·59	0·90	1·10	1·33	1·00	0·73	1·02	0·98	0·060	0·063	0·080	0·080	0·085	0·046	0·070	0·011
September - -	16·09	18·07	17·16	18·12	18·00	15·84	18·76	25·45	0·83	0·80	0·95	1·01	0·85	0·79	1·26	1·25	0·085	0·073	0·095	0·084	0·061	0·038	0·050	0·033
October - - -	18·64	19·00	18·43	19·42	18·51	17·88	18·09	25·39	0·91	0·92	1·07	0·81	0·60	0·65	0·84	1·36	0·081	0·091	0·083	0·070	0·062	0·029	0·058	0·032
November - -	20·15	20·36	20·81	20·28	21·18	20·09	22·39	26·25	0·88	0·88	1·44	1·43	1·12	0·67	0·99	0·58	0·098	0·091	0·169	0·157	0·128	0·082	0·114	0·034
December - -	21·07	20·76	21·64	20·28	20·08	21·09	23·85	26·74	0·96	1·14	1·68	1·23	1·12	0·70	1·21	0·79	0·083	0·111	0·183	0·136	0·119	0·080	0·125	0·011
Yearly Average -	19·03	19·48	19·50	19·27	19·50	18·25	20·38	25·98	1·11	1·12	1·34	1·32	1·17	0·94	1·23	1·21	0·077	0·077	0·095	0·095	0·088	0·049	0·071	0·024

These results are the averages of the corresponding months in the two years (1865 and 1866), and they show that, in the case of the Thames and River Lea, the *maximum* amount of solid matter is found in the water during the winter months, when the rainfall is greatest, and the evaporation least; and the *minimum* amount of solid matter is found in the water in the months of July, August, and September, when the rainfall is least, and the evaporation greatest.

TABLE No. 4.—COMPARISON of the QUALITY and QUANTITY of WATER supplied by the METROPOLITAN WATER COMPANIES in the Years 1851, 1856, and 1867.

COMPANIES.		Solid Matter, per Gallon.			Organic and other Volatile Matter, per Gallon.			Degree of Hardness.			Quantity supplied per Day.		
		1851.	1856.	1867.	1851.	1856.	1867.	1851.	1856.	1867.	1851.	1856.	1867.
		Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Degrees.	Degrees.	Degrees.	Gallons.	Gallons.	Gallons.
New River		19·50	21·71	21·55	2·79	0·96	0·57	14·9	13·6	14·0	15,485,617	25,000,000	22,931,917
East London		23·51	21·43	24·36	4·12	1·14	0·30	15·0	14·3	14·5	9,036,049	16,000,000	19,321,988
Thames Companies	Chelsea	21·28	21·85	18·94	2·38	1·21	0·99	14·4	13·3	13·5	3,940,730	5,323,000	7,918,375
	West Middlesex	22·67	20·58	19·68	2·75	1·47	0·46	14·6	14·0	13·2	3,334,054	6,895,368	8,236,882
	Grand Junction	21·72	22·28	19·97	3·07	1·50	1·19	14·0	15·0	13·0	3,541,717	6,714,292	8,709,090
	Southwark and Vauxhall	21·08	20·85	20·02	1·51	1·34	1·01	15·0	13·3	13·2	6,013,716	10,331,122	12,679,311
	Lambeth	20·40	19·65	18·78	2·59	1·03	1·24	14·2	11·7	13·5	3,077,260	6,109,000	8,950,567
Kent		29·71	26·18	27·12	2·61	1·22	0·16	16·0	11·8	16·0	1,079,311	2,363,730	5,927,200
											Total.	Total.	Total.
Average of Thames Companies		21·43	21·04	19·48	2·46	1·31	0·98	14·4	13·5	13·3	19,907,477	36,049,782	46,494,225
Average of New River and East London		21·50	21·57	22·95	3·45	1·05	0·43	14·9	13·9	14·2	24,471,666	41,000,000	42,253,905
Average of all Companies		22·48	21·81	21·30	2·73	1·23	0·74	14·8	13·4	13·9	45,815,925*	78,202,842†	94,675,330

The Returns of 1851 are taken from the Report by the Government Commission on the Chemical Quality of the supply of Water to the Metropolis in 1851; and those of 1856 are taken from the Reports to the Right Hon. William Cowper, M.P., President of the General Board of Health on the Metropolis Water Supply in 1856.

* This total includes 427,468 gallons of Water daily, supplied by the Hampstead Company in 1851.
† This total includes 603,060 gallons of Water daily supplied in 1856 by the Hampstead Water Company, and 550,000 gallons supplied in the same year by the Plumstead, Woolwich, and Charlton Water Company.

In 1851, the Population of London was 2,362,236; consequently there were 19·4 gallons of Water supplied per head of the whole Population.
In 1856 " " 2,583,112; " 30·2 " " " "
In 1867 " " is 3,067,536; " are 30·9 " " " "

TABLE No. 5.—QUALITY of the WATER supplied to the following TOWNS in ENGLAND.

Name of Town.	Appearance of the Water when Examined in a Glass Tube Two Feet in Length.	Solid Matter per Gallon.	Organic and other Volatile Matter per Gallon.	Oxygen required to Oxydise Organic and other Matter.	Ammonia per Gallon.	Hardness.		1861.	
						Before Boiling.	After Boiling.	Population.	Mortality per 1,000 of Population.
		Grains.	*Grains.*	*Grains.*	*Grains.*	*Degrees.*	*Degrees.*		
Birmingham	Slightly turbid, and pale olive green	37·70	1·65	0·090	0·020	15·5	11·5	212,621	24·4
Leamington	Slightly turbid, and pale greenish yellow	36·79	1·98	0·185	0·045	18·5	9·0	18,768	18·8
Guildford	Bright and colourless	30·50	2·50	0·075	0·002	18·5	7·8	29,330	19·4
Sunderland and South Shields	ditto - ditto	29·75	1·10	0·020	0·001	12·6	8·0	135,553	20·7
Southport	ditto - ditto	28·35	2·63	0·075	0·020	19·5	12·5	14,647	19·0
Newcastle and Gateshead	Slightly turbid, and pale greenish yellow	22·55	0·95	0·080	0·019	19·5	5·5	14,646	19·0
Wakefield	Turbid and olive green	22·25	1·34	0·140	0·115	16·0	12·0	55,049	24·8
Dover	Bright and nearly colourless	22·01	1·04	0·005	0·001	17·0	6·5	31,575	24·2
Canterbury	ditto - colourless	21·85	1·00	0·007	0·020	18·0	4·5	16,643	21·4
Norwich	ditto - nearly colourless	21·19	1·10	0·020	0·025	14·5	5·0	74,440	26·7
Croydon	ditto - - ditto	20·75	0·80	0·020	0·001	16·4	5·1	46,474	17·4
York	ditto - - ditto	19·08	0·80	0·080	0·020	14·3	7·0	59,909	24·0
Derby	ditto - - ditto	19·02	1·06	0·035	0·001	14·4	7·0	51,049	25·3
Lincoln	ditto - pale olive green	18·34	1·35	0·078	0·008	11·0	7·5	47,063	20·9
Worcester	ditto - pale peaty tint	16·89	1·53	0·106	0·035	10·0	6·0	30,969	20·0
Cheltenham	ditto - nearly colourless	15·70	1·06	0·087	0·040	12·0	6·0	49,792	18·9
Liverpool and West Derby	Slightly turbid and peaty	14·64	0·55	0·085	0·030	9·6	3·5	495,587	28·2
Durham	Bright and nearly colourless	13·58	1·01	0·103	0·030	7·5	6·0	70,274	20·7
Leeds	ditto - pale olive green	13·37	0·58	0·110	0·040	7·5	6·5	117,566	26·0
Edinburgh	ditto - nearly colourless	10·30	0·57	0·060	0·002	7·0	2·0	176,081	27·4
Preston	Turbid and slightly peaty	7·81	0·07	0·145	0·035	5·5	2·9	110,523	28·9
Dundee	Slightly turbid and peaty	7·00	0·50	0·170	0·002	4·3	1·5	—	—
Sheffield	Bright and peaty	5·90	0·50	0·080	0·013	2·0	2·0	128,951	26·2
Glasgow, south of Clyde (Gorbals)	Slightly turbid and peaty	5·94	0·63	0·155	0·028	2·9	1·0	440,979	27·1
Glasgow, north of Clyde (Loch Katrine)	ditto - - ditto	1·90	0·30	0·110	0·032	1·0	1·0		
Plymouth	Bright and rather peaty	4·29	0·41	0·055	0·032	3 0	1·0	62,599	22·1
Manchester and Salford	ditto - deep olive green	4·17	0·25	0·125	0·006	2·5	2·0	349,323	28·7
Towns with water over 10 degrees hardness	Bright and nearly colourless	23·90	1·37	0·068	0·028	14·9	7·1	- -	22·2
Ditto under ditto	Generally slightly turbid and peaty	8·33	0·49	0·102	0·021	4·9	2·6	- -	26·1
Metropolitan water	Bright and slightly greenish yellow	20·17	1·18	0·072	0·002	13·0	4·5	- -	23·1

TABLE No. 6.—COMPOSITION of the WATERS of the PUMPS and SURFACE WELLS of the CITY of LONDON.

NAMES OF PUMPS.	Carbonate of Lime and Magnesia.	Sulphate of Lime and Magnesia.	Alkaline Chloride.	Alkaline Nitrate.	Silica and Alumina.	Organic and other Volatile Matter.	Total per Gallon.
	Grains.	*Grains.*	*Grains.*	*Grains.*	*Grains.*	*Grains.*	*Grains.*
Aldgate - - - - - - - - -	23·43	15·63	13·17	19·37	0·96	4·87	77·43
Aldgate High-street - - - - - - -	25·30	24·30	20·70	24·20	1·12	8·13	103·75
Bartholomew-lane - - - - - - - -	21·70	16·17	15·47	16·50	0·97	4·56	75·37
Basinghall-street - - - - - - - -	21·17	25·20	12·73	13·60	0·97	6·30	79·97
Bell-yard, Gracechurch-street - - - - - -	19·29	12·80	19·11	19·58	1·00	8·22	80·00
Bishopsgate Church - - - - - - -	22·60	21·20	18·20	17·33	1·10	6·23	86·66
Bishopsgate-street by Dunning's Alley - - - -	32·23	33·54	22·43	16·06	1·50	9·07	114·83
Bow Churchyard - - - - - - - -	25·80	19·13	18·47	12·87	1·00	5·43	82·70
Bowling-square - - - - - - - -	18·67	26·20	11·17	9·13	1·00	4·93	71·10
Bride-lane - - - - - - - - -	14·53	23·07	25·53	24·27	0·93	6·87	95·20
Cannon-street West - - - - - - -	14·80	13·73	10·87	25·53	1·00	5·10	71·03
Chequer-yard, Dowgate-hill - - - - - -	20·53	16·43	11·87	16·57	1·03	7·03	73·46
Cock-and-Hoop Yard, Houndsditch - - - - -	19·93	17·33	13·03	21·90	1·00	5·60	77·79
Cornhill - - - - - - - - -	22·13	18·20	10·70	16·23	1·20	5·37	73·83
Cree Church-lane - - - - - - - -	21·07	9·43	6·70	7·17	0·87	2·56	47·80
Fenchurch-street - - - - - - - -	21·77	20·23	14·50	21·33	0·87	7·23	85·93
Guildhall - - - - - - - - -	12·90	8·65	4·30	3·05	0·95	2·90	32·75
Guildhall Buildings - - - - - - -	13·37	4·40	3·40	2·76	0·60	2·10	26·63
Gutter-lane - - - - - - - - -	16·57	15·53	7·47	10·53	0·97	5·33	56 40
Great St. Helen's - - - - - - - -	15·47	10·83	6·50	12·27	0·76	3·50	49·33
Half-Moon Passage - - - - - - -	16·40	13·00	17·23	15·00	0·87	3·50	66·00
Herald's College Yard - - - - - - -	14·57	21·90	15·87	30·50	0·93	5·86	89·63
Honey Lane Market - - - - - - -	16·10	10·50	9·23	6·63	1·10	3·27	46·83
Idol-lane - - - - - - - - -	15·70	19·50	15·73	22·63	1·30	5·44	80·30
Ironmonger-lane - - - - - - - -	19·27	30·60	13·57	15·07	1·26	6·90	86·67
Leadenhall Market - - - - - - - -	16·63	23·97	38·60	29·13	1·07	5·53	114·93
Little Britain - - - - - - - -	25·27	29·93	13·83	6·42	1·43	8·27	85·17
Minories - - - - - - - - -	21·93	21·70	15·46	29·00	1·23	6·63	95·97
Milton-street, Cripplegate - - - - - -	33·63	37·84	22·93	23·50	1·33	8·34	127·57
Mitre-square - - - - - - - - -	17·23	10·33	7·27	6·03	0·97	4·37	46·20
Newgate Market - - - - - - - -	19·73	14·14	13·70	14·70	1·30	6·83	70·40
Old Jewry - - - - - - - - -	18·50	15·20	7·70	13·33	0·94	4·93	60·27
St. Mary-Axe - - - - - - - -	23·47	19·93	12·57	20·74	1·13	5·53	83·37
St. Nicholas Olave Churchyard - - - - -	21·03	29·17	31·87	38·36	1·20	8·10	129·73
St. Paul's Churchyard - - - - - - -	20·60	15·20	9·47	20·80	1·10	4·10	71·27
East London Water Company - - - - - -	13·08	3·33	1·36	2·07	0·47	0 56	20·87
New River Water Company - - - - - -	12·58	2·41	1·28	2·08	0·38	0·32	19·05
Thames Companies - - - - - - - -	11·91	2·36	2·01	2·16	0·52	0·84	19·80

H. Letheby, M.B., M.A., &c., Professor of Chemistry in the London Hospital, and Medical Officer of Health for the City of London.
W. Odling, M.B., F.R.S., &c., Professor of Chemistry in St. Bartholomew's Hospital.
F. A. Abel, F.R.S., &c., Chemist to the War and Ordnance Department, Woolwich.

Appendix. No. 3.

REPORT on the QUALITY and QUANTITY of the WATER supplied to the METROPOLIS in the Year 1866, as compared with the Year 1851.

To the Honourable Streets Committee of the Commissioners of Sewers.

Gentlemen,

IN accordance with your request I submit my report on the matter referred to in the letter from the Metropolitan Board of Works of the 30th of October last, respecting the present water supply to the metropolis, and asking for information thereon.

I may premise that I have for many years past regularly examined the quality of the water supplied by all the water companies to the metropolis, and the results have been published monthly by the Metropolitan Association of Medical Officers of Health.

The average of these results for the eleven months of the present year, indicate a very satisfactory condition of the water supply, both as regards the quantity and chemical quality of the water.

At the present time, the average daily supply of water to the metropolis, is nearly 93 millions of gallons. This is at the rate of rather more than 200 gallons per house, or over 30 gallons per head. In the year 1851, when there was a Government Commission appointed to inquire into the condition of the metropolitan water supply, it was found that the average daily supply to the whole of London was only a little more than 45 millions of gallons. This was at the rate of about 19 gallons per head. In the course of 16 years, therefore, the amount of water daily supplied to the metropolis, has been more than doubled; and the proportion per head has risen from 19 gallons to 30.

It appears also that the chemical quality of the water has notably improved. At present the water derived from the Thames contains about 19½ grains of solid matter per gallon, of which a little less than 1 grain is composed of organic and other matters, which are volatile at a red heat. In 1851 the total amount of solid matter in the water from the Thames, ranged from 21 to nearly 23 grains per gallon; and of this from 1½ to 3 grains were volatile at a red heat. So also with regard to the water derived from other sources than the Thames; for it will be seen that the total amount of solid matter has been diminished about three grains per gallon; and the organic and other volatile constituents have been reduced from about three grains per gallon to one. There has, therefore, been a marked improvement in the quality of the water during that interval; and no doubt this has been effected by better methods of storage, as in covered reservoirs, and by very careful processes of filtration at the companies' works. The total quantity of real organic matter in the water supplied to the metropolis at the present time is surprisingly small; for it does not in any case amount to three-quarters of a grain per gallon. In the water derived from the Thames, it averages about six-tenths of a grain per gallon; in that supplied by the East London Company it is a little less than half a grain per gallon; in the New River water, it is only a quarter of a grain, and in that of the Kent Company it hardly amounts to the tenth part of a grain per gallon. It must be admitted, however, that in a sanitary point of view it is not so much the quantity of organic matter as the quality of it which determines the fitness of water for domestic purposes. In the present case, there is no evidence, chemical, physical, or pathological, that the organic matter in the water supplied to the metropolis is any other than the harmless products of vegetable and infusorial growths. Contrasted with the water obtained from the surface wells of London, the difference of quality is most striking; for not only is there an absence from the companies' waters of the saline substances which are peculiarly characteristic of animal excreta, but the nature and amounts of the volatile matters, commonly called organic, are essentially different. I refrain from entering on the question which has called for this Report, namely, the observed relation or connection of the water supply in any part of the metropolis with the recent epidemic, for I intend to make this the subject of a special inquiry and report to you; but I may state that while there is ample proof of the propagation of choleraic disease by certain well-waters of London, there is at present no evidence that the public water supply has had anything whatever to do with the localisation or spread of the recent epidemic. Already in the eastern parts of London, where the disease was most fatal, the Medical Officers of Health have reported to this effect, and have shown that the largest mortality from cholera was of persons who were not water-drinkers, and that teetotallers and others who drank largely of the East London water in its unboiled condition have been singularly exempt from the disease. At the City of London Workhouse at Bromley, where the inmates partook of well-water alone, there were 20 deaths from the epidemic in one week; whereas, at the East London Workhouse at Hackney, which is supplied with the East London Company's water, there has not been a single death from cholera. So also in the eastern part of the City of London, I have been unable to trace the least connection between the epidemic and the water supply. As far, therefore, as medical observation has hitherto gone, there has been no proof of the soundness of the hypothesis which has led to these inquiries.

As regards the other question which has been submitted to me, namely, the desirability of a constant supply as compared with an intermittent, there can be but one opinion; as an

Appendix, No. 3.

as abstract question, indeed, it admits of no discussion; for it is admitted on all hands that a constant supply secures to us an unlimited quantity of water in its purest and most agreeable condition. But the practical difficulties of it in this metropolis are immense. At the present time there is hardly a house in London which has the fittings in a proper condition to receive it, and until this is altered it is vain to expect a constant service. The 15th section of "The Metropolis Water Act of 1852" gives power to the inhabitants of any district supplied by a water company to enforce a constant supply, provided that four-fifths of the owners or occupiers of the houses on any main demand it in writing, and put their pipes, cocks, cisterns, machinery and arrangements of all kinds in proper condition to receive it. This is the first step towards the realisation of such an object; and the maintenance of a constant supply can only be by the strictest supervision, and by the most rigid enforcement of every obligation on the part of the owners of houses through the severest penalties. If indeed there be neglect or wilful derangement of the taps, cisterns or other machinery used in the water-service of any house, there will not only be an enormous waste of water and the depriving of others of it who are at a higher level, but there will also be great danger to property from the escape of the water and the flooding of houses. Anything indeed like the carelessness which now prevails in respect of the taps and fittings, would cause such a waste of water as no source of supply could maintain; and I much doubt if the London public would submit to the strict supervision and the severe obligations which a well-regulated constant supply demands. It is well enough to entertain the matter in its speculative and abstract relations as an unquestionable advantage, but it is another thing to fulfil the obligations which its practical adoption imposes. This is manifested by the disinclination of the occupiers of houses to avail themselves of the Act of Parliament by making proper provision for it; for what could be easier, if a constant supply were really desired, than the specified legal process for obtaining it. I believe that the London water companies are not adverse to such a supply, but they very properly insist upon the conditions which are necessary for its adoption and maintenance; for they look with alarm at the consequences of it with the present state of things. Whenever in the City we have guaranteed that there should be no waste of water, by providing a waste-water preventer, we have met with no difficulty from the companies in obtaining a constant supply, and I submit a list of places where the Commissioners of Sewers and the Jewish Board of Guardians have erected stand-pipes, with constant service, for the use of the poor. And I should regard it as an inestimable advantage, if, by such a service, we could everywhere abolish the filthy butts and cisterns of the lodging-houses of the City.

I remain, &c.

Guildhall. (signed) *Henry Letheby.*

Appendix, No. 4.

METROPOLIS WATER INQUIRY.—Session 1867.

TURN, required by the Chairman for the Use of the Committee upon this Inquiry, of the Average Daily Quantity of WATER Supplied by each of the METROPOLITAN COMPANIES.

ME OF THE OMPANY.	Gross Average Daily Quantity in 1866.	Quantity for other than House Supply.	Quantity for House Supply.	Number of Houses.	Quantity per each House.	Population, Estimated at about.	Quantity per Head of Population.	Remarks on probable Causes of Difference per Head or per House in Supply of Different Companies.
EE COMPANIES:	*Gallons.*	*Gallons.*	*Gallons.*		*Gallons.*		*Gallons.*	
River Company -	22,898,769	4,361,965	18,536,804	109,198(*a*)	169·75	800,000	23·17	The average rate of consumption may be higher in some districts than in others, because of the generally larger size of the houses supplied, the prevalence of baths, &c., the amount of trade demands, and the degree to which waste may go on unchecked.
London Waterks Company.	19,380,000	5,000,000	14,380,000	90,174(*b*)	160 (nearly)	658,570(*c*)	22 (nearly)	The East London Company can only say that the return they make is, in their own case, the best approximation in their power.
TAL drawn from the River Lee and the Wells of the New River Company.	42,278,769							
COMPANIES:								
ea Waterworks mpany.	8,000,000	1,193,000	6,807,000	26,900	253	201,000	33·86	House supply includes stables. About one-fourth of the houses are of the largest class. The population is based on the official returns.
Middlesex - -	8,208,168	556,000	7,652,168	36,500	210 (nearly)	255,500	30 (nearly)	The West Middlesex Company have no sufficient knowledge of the character and requirements of other Water Companies' districts to enable them to account for any differences in the quantities of water supplied per house or per head which may appear between their own returns and those of the other Companies.
Junction Waters Company (Milmas, 1866):								
plied to tenants -	8,778,205	653,846	8,124,359	26,450	307	238,050	34	The Grand Junction Company's district contains a large proportion of first-class houses and many noblemen's mansions, having a considerable number of water-closets, many fixed baths, heating apparatus, &c.
d for sand-washng, condensing, &c., t the Company's orks.	538,850	—	—	—	—	—	—	
hwark and Vauxll Water Company Iichaelmas 1866).	12,502,000	3,076,712	9,425,288	66,530 2,215(*d*) 2,235(*e*)	132¾ (*f*)	449,540	21 (*f*)	In districts where a better class of houses exists than in the Southwark and Vauxhall Company's district, large quantities of water are consumed for baths, hot-water apparatus, water-closets, kitchen boilers, and for general purposes.
			TOTAL - -	70,980				
beth Waterworks mpany.	8,950,000	1,251,000	7,699,000	37,203	207	225,000	34·22	The company supply about 5,000 houses in the country districts, which take large quantities of water for gardens, small fountains, &c.
TAL drawn from the Thames -	46,977,223							
Vells, Kent Water-.	6,150,000	366,000	5,784,000	33,864	171	237,068	24·4	The consumption of water is greater in first-class houses, and where sewers exist. The Kent Company supply both rural and town districts, with an average proportion of large and small houses.

xcluding trade and business premises and public buildings.

his number differs from that given in the answer to Question 5, the Return now made being for the year 1866, and the Return to Question 5 being arch 1867.

his number differs for the same reason. It is arrived at by multiplying 90,174 houses by an assumed number of inhabitants, 7·30 per house. *See* to Question 5.

aken into charge since return to Committee.

ot yet brought into charge.

For domestic supplies only.

Appendix, No. 5.

METROPOLIS WATER INQUIRY.

RETURN, ordered by the Committee, of the Amount of CAPITAL, RATE of DIVIDEND, and BONUS (if any), of the sever METROPOLITAN WATER COMPANIES, for the Years undermentioned, viz.:

NAME OF THE COMPANY.	1850.		1851.		1860.		1861.		1865.		1866.		Bonus (if betwee 1850 and
	Capital.	Dividend.	Capital.	Dividend.	Capital.	Dividend.	Capital.	Dividend.	Capital.	Dividend.	Capital.	Dividend.	
	£.	£.	£.	£.	£.	£. s. d.	£.	£. s. d.	£.	£. s. d.	£.	£. s. d.	
New River - - -	1,491,671	4⅒	1,519,958	4	1,519,958	4 – 7½	1,519,958	4 1 1	1,519,958	5 8 11¼	1,519,958	6 2 2½	
	N.B.—In 1854, the Company formed a reserve fund, by setting aside a portion of the half-yearly profits, in order to guard against the result of acc to the extensive works carried out under the provisions of the 1852 Act and subsequent Acts. In 1866, it was considered that time had c lidated these works, and that the danger to guard against which this fund was created had in a great measure passed away. The Dire therefore determined to restore to the proprietors a portion of the profits which, in previous years, had been withheld from them, and a d bution of 1,400 *l.* per share, or 6 *l.* 11 *s.* 6¾ *d.* per cent. upon the capital was made, which reduced the fund to 21,417 *l.* 9 *s.* 5 *d.* It is observed that the increase in dividends in 1865 and 1866 is chiefly the result of the Company having ceased to make the usual additio this fund.												
East London - - -	500,000	8	500,000	8	975,000	5 15 1	975,000	6	1,133,818	5 12 –	1,247,560	6 16 2	Three of 1 per each, on o stock.
Chelsea - - - -	300,000	2⅛	300,000	2¼	570,000	3¾	570,000	4¼	610,000	5¼	615,600	5½	
	N.B.—In addition to the said capital of 615,600 *l.* the Company have expended on permanent works 170,000 *l.* (raised on existing bonds at inte and 103,500 *l.* produced on sale of surplus lands.												
West Middlesex - -	506,300	6 per share.	506,300	6 per share.	704,904	5 per share of 61 *l.*	722,098	5 per share of 61 *l.*	785,746	5 12 6 per share of 61 *l.*	794,367 *	5 15 – per share of 61 *l.*	
	* *N.B.*—£. 4,204 has been added to the capital since Christmas, 1866, making the capital at Lady-day 1867, 798,571 *l.*												
Grand Junction (Share Capital)	331,000	8	331,000	8	550,000	7½	550,000 15,745 565,745	7½ 4	546,000 4,000 50,000 31,725 631,725	8¼ 7½ 5¾ 4	546,000 54,000 34,280 634,280	8½ 7½ 4	
Southwark and Vauxhall (Shares).	303,218	5	304,012	5	386,790	5½	374,010 38,300	6 5	377,700 126,500 89,425	6 5 4½	377,870 126,500 125,160	6½ 5 4½	
	N.B.—The increase in the dividend is mainly owing in late years to the low rate paid on the mortgage debt of the Company.												
Lambeth (Shares) - -	211,881	5	257,526	5	361,330	5½	387,600	5½	502,992	6	532,130	6	
Kent Water Works:													
June - - - -	229,500	At the rate of 3 *l.* 15 *s.* per cent. perannum.	254,500	At the rate of 4 *l.* per cent. per annum.	327,125	At the rate of 5 *l.* per cent. per annum.	351,150	At the rate of 5 *l.* per cent. per annum.	409,750	At the rate of 6 *l.* per cent. per annum.	428,945	At the rate of 6 *l.* per cent. per annum.	None.
December - -	229,500	Ditto -	262,500	Ditto -	351,150	Ditto -	351,150	Ditto -	£. s. 419,122 10	Ditto -	428,945	Ditto -	

Appendix, No. 6.

In Parliament.—In the House of Commons, Session 1867.

Appendix, No. 6.

EAST LONDON WATER BILLS, &c.

Particulars of Documents put in Evidence on the part of the Metropolitan Water Companies.

(*See* Minutes, 16 May 1867, Q. 985.)

1.—Minutes of Evidence taken before the Select Committee of the House of Commons on the Metropolis Water Bill in Session 1851. Ordered by the House of Commons to be printed, 5th August 1851.—Par. Pro. 643.

2.—Minutes of Evidence taken before the Select Committee of the House of Commons on the Metropolis Water Bill in Session 1852. Ordered by the House of Commons to be printed, 24th May 1852.—Par. Pro. 395.

3.—Report of John Simon, medical officer of the General Board of Health, to the Right Honourable William Cowper, M.P., the President of the Board, dated 13th May 1856, and presented to both Houses of Parliament by command of Her Majesty, in which the following appears. *See* pp. 12 and 13.

"But the question is of a larger scope, whether water can securely be drunk from rivers polluted by urban drainage, interests more or less every part of the country, and whatever facts can terminate this doubt bear upon every plan for the water supply of a population, and upon every plan for the drainage of a town."

"Not even London can in this respect afford to consider itself safe against the danger which seems to have been removed from it. Lower than Teddington Lock, indeed, the Thames may not be used as a source of supply, but, above that point, there dwell beside the river or its tributaries very considerable urban populations, and hitherto the Legislature has not provided against any pollution of refuse which these communities may drain into the stream. At present, perhaps, the mischief is not great; the population is scattered; the drainage incomplete; the admixture, as compared with the volume of the river, almost insignificant. But whatever at this moment may be the amount of the evil, undoubtedly it tends, day by day, to increase; and that reform which the Act of 1852 purported to accomplish remains but imperfect and precarious, while those riverside populations exercise a right of sewerage into the drinking water of London.

"It is, indeed, indispensable for the healthiness of towns that house drainage should be universally adopted, and that its currents should rapidly discharge themselves beyond the inhabited area. But the advantages thus to be gained will suffer a serious counterpoise if they can be purchased only at the cost of making the sewerage outfall into rivers; if the change must be, from an unwholesome house to a polluted water source; if that which would have been poison to inhale is to return as poison to drink."

* * * * * * * *

"From the sanitary dilemma which these considerations suggest, the only possible escape seems to be in the organisation of means for the systematic agricultural employment of sewage.

"Hence, it is greatly to be hoped that the engineering genius and commercial enterprise of the country may render such means available and lucrative for all urban populations."

4. Report on the Chemical Quality of the Supply of Water to the Metropolis, by A. W. Hoffmann, Professor of Chemistry in the Metropolitan School of Science, and Chemist to the Museum of Practical Geology, F.R.S., PH. D., L.L.D., &c., and Lindsey Blyth, Esq., Lecturer on Natural Philosophy at St. Mary's Hospital, to the Right honourable

Appendix, No. 6.

William Cowper, M. P., 1856; presented to both Houses of Parliament by command of Her Majesty; in which the following appears. *See* pp. 15 and 16:—

"*A very considerable diminution however is observed in the amount of organic matter.*

" In fact, in 1856, the water supplied to the metropolis contained not more than one-half " of the organic matter which was present in the year 1851.

" The result is certainly not accidental. The diminution is not merely an average result, " but uniformly observed throughout. The waters examined in 1851 were taken in January, " those investigated in 1856, partly in January and partly in April. The diminution of the " organic matter cannot therefore be due to the influence of the season; nor can it be due to " any difference in the mode of determining the organic matter in 1851 and 1856. These determinations were made by exactly the same method; for it so happens that the analytical parts " of the inquiry in 1851, which refers to the organic matter, was likewise made in the laboratory of the Royal College of Chemistry. The diminution is, obviously, partly due to " the alteration of the localities from which many of the companies derive their supply. " The Grand Junction, the West Middlesex, the Southwark and Vauxhall Companies, " formerly supplied respectively at Kew, Barnes, and Battersea, derive their present water " from Hampton; the Lambeth Water Company used to take their water at Lambeth, but " have now erected extensive works at Thames Ditton.

" The diminution of the organic matter in the London water supply is, however, by no " means confined to the companies that have changed the locality of their source, and " it must therefore be attributed, in a great degree, to the considerable improvement " which has taken place in the collection, filtration, and general management of the supply " of water to the metropolis."

5.—Report on the Works of the Metropolitan Water Companies, by Henry Austin, William Ranger, and Alfred L. Dickens, Superintending Inspectors of the General Board of Health, to the Right Honourable William Cowper, M.P., &c., dated 21st July 1856, and presented to both Houses of Parliament by command of Her Majesty, in which the following appears. (*See* pp. 101 and 102).

" In conclusion we desire to observe, as the result of our investigations, into the present " state of the metropolitan water supply—

" 1st. That the requirements set forth in the commencement of our Report, comprising " the 1st, 2nd, 3rd, 4th, 14th, and 17th clauses of the Metropolis Water Act 1852, have, " in all essential respects, been fully and satisfactorily complied with by the several companies (the provisions for constant supply not coming into operation until the 1st July " 1857). The new works have not, in fact, been limited to what a bare compliance with " those provisions would have fulfilled. Measures have been adopted for the general " improvement of the supplies, which evince a proper anxiety on the part of the companies in the discharge of the duties of their position towards the public.

" 2nd. That, having regard to the serious state of contamination to which many of the " rivers and streams of the country are being reduced by the drainage operations carried " out in the neighbouring towns, and by the direct discharge of the sewage without any " means adopted for the prevention of the pollution of the waters, (a condition which is " evidenced to the inhabitants of the metropolis by the suddenly increased pollution of the " Thames itself, at the points whence their water supply has but recently been drawn,) " we desire to recommend that early attention be directed to the towns draining into the " Thames and its tributaries, and into the Lea and Ravensbourne, above the present " sources of supply, so that measures may be adopted with regard to the drainage of those " places which will permanently preserve the supply of water to the metropolis in its " utmost practicable state of purity."

6.—First Report of the Commissioners appointed by Royal Commission, dated 18th May 1865, to inquire into the best Means of preventing the Pollution of Rivers (River Thames), dated 29th March 1866; presented to both Houses of Parliament by command of Her Majesty.

7.—Copy of a letter, dated 12th May 1866, addressed, by direction of the Secretary of State for the Home Department, to the Metropolitan Water Companies, making inquiries as to the changes that may have taken place in relation to the supply afforded by those Companies since the Report on the Metropolitan Water Supply made to the General Board of Health in 1856; with a Tabular Summary of the Replies of the Companies thereto. Presented to Parliament by command of Her Majesty, and ordered by the House of Commons to be printed, 10th August 1866.—Par. Pro. 497.

8.—Extract Minutes of Evidence taken before the Select Committee on the Thames Navigation Bill, in Session 1866.

" 15 June Mr. Phinn handed in the following paper to the Committee:

" THAMES NAVIGATION BILL.

" As solicitors to the several metropolitan Water Companies taking water from the " Thames, we are authorised to state that, in consideration of the benefits to be derived " from the operations of the Act, and more particularly by restrictive clauses and amend-

"ments, to the satisfaction of the water companies, being inserted in the Bill to prevent all "sewage, &c. flowing into the Thames, the water companies are prepared to pay the "sum of 1,000 *l.* per annum each, irrespective of what they now pay. Our object in "making this proposal is to save further expenditure to all parties, and, if the arrangement "is to be carried out, it should be prior to the meeting of the Committee to-morrow.

"*Few & Co,* Solicitors to the Chelsea Water Works.
"*Bell, Steward & Lloyd,* Lambeth Water Works.
"*Bailey, Shaw, Smith & Bailey,* West Middlesex "Water Works.
"*Hargrove, Fowler & Blunt,* Solicitors to Southwark "and Vauxhall Water Company and Grand "Junction Water Works Company.

"London, 14 June 1866.

"The room was ordered to be cleared. After some time Counsel and Witnesses were "called in.

"The Chairman stated, that the Committee having considered the proposal which had "been handed in, agreed to the following resolution,—

"That the Committee having considered the proposal of the contribution of 1,000 *l.* "a-year by each of the Water Companies, in addition to their present payment, are pre-"pared to accept it."

9.—The Thames Navigation Act, 1866.

10.—A Bill, to be called "The Thames Navigation Act, 1867," pending in the House of Lords.

Appendix, No. 7.

TABLE showing the WATER COMPANIES supplying each of the Parishes and Districts constituted under the Provisions of the METROPOLITAN MANAGEMENT ACT, Number of Vestrymen and of Health Officers, Area in Statute Acres, Annual Value of Property assessed in 1866, Estimated Population in 1866, Deaths, and the Rate of Mortality to 10,000 Population from All Causes and from Cholera and Diarrhœa, Density of Population, Elevation, and Annual Value of Property per Head of Population.

Water Company furnishing Chief Supply.	PARISHES AND DISTRICTS constituted under the Provisions of the Metropolis Management Act, 18 & 19 Vict. c. 120.	Number of Members of Board or Vestry.	Number of Health Officers.	Area in Statute Acres.	Annual Value of Property assessed in 1866.	Estimated Population in 1866.	Deaths in 1866 from				Rate of Mortality per 10,000 in 1866.				Persons to an Acre in 1866.	Elevation in Feet above Trinity High-water Mark of the Thames.	Annual Value of Property per Head of Population.
							All Causes.	Cholera.	Diarrhœa.	Cholera and Diarrhœa.	All Causes.*	Cholera.†	Diarrhœa.	Cholera and Diarrhœa.			
	LONDON - - -	2,511	47	77,997	£. 15,261,999	3,037,991	80,129	5,577	3,184	8,761	264·7	18·4	10·5	28·9	39·0	39	£. 5·006
	WEST DISTRICTS.																
J. W. M.	Paddington	72	1	1,245	758,344	93,365	1,720	26	80	106	174·4	2·8	8·6	11·4	75·0	78	8·122
WMc.	Kensington	84	1	1,942	501,132	85,171	1,962	18	106	124	229·6	2·1	12·4	14·5	43·9	23	5·884
WM. J.c.	Fulham	39	1	4,155 *w*	171,876	48,657	1,153	41	65	106	249·2	8·4	13·4	21·8	11·7	7	3·532
J. W. M. c.	*Kensington Registration District*	*195*	*3*	*7,342 w*	*1,431,352*	*227,193*	*4,835*	*85*	*251*	*336*	*214·1*	*3·7*	*11·0*	*14·7*	*30·9*	*40*	*6·300*
C.	Chelsea	60	1	865 *w*	299,868	65,957	1,704	22	48	70	269·4	3·3	7·3	10·6	76·3	12	4·546
J. C.	St. George, Hanover-square	108	2	1,161 *w*	1,076,272	94,315	1,907	18	50	68	181·0	1·7	5·3	7·0	81·2	34	11·411
C.	Westminster	57	1	917 *w*	341,116	68,268	1,884	42	69	111	266·9	6·2	10·1	16·3	74·4	3	4·997
N. C.	St. Martin-in-the-Fields	36	1	305 *w*	265,336	21,370	565	9	25	34	245·4	4·2	11·7	15·9	70·1	38	12·416
J. N.	St. James, Westminster	48	1	164	462,032	34,155	797	12	15	27	248·0	3·5	4·4	7·9	208·3	58	13·527
	NORTH DISTRICTS.																
WM. J.	Marylebone	120	1	1,509	1,053,748	159,871	4,129	54	181	235	255·6	3·0	11·3	14·3	105·9	87	6·591
N. WM.	Hampstead	24	1	2,252	147,624	23,557	395	2	15	17	178·2	·8	6·4	7·2	10·5	350	6·267
N. H. WM.	Pancras	117	1	2,716	925,872	211,825	5,248	138	205	343	241·7	6·0	9·7	15·7	78·0	73	4·371
N.	Islington	117	1	3,127	777,632	193,648	5,135	120	167	287	225·9	4·3	8·6	12·9	61·9	94	4·016
N. E.	Hackney	57	1	3,929	370,616	97,120	2,394	103	74	177	250·3	10·6	7·6	18·2	24·7	53	3·816
	CENTRAL DISTRICTS.																
N.	St. Giles	48	1	245	277,412	52,226	1,502	48	84	132	305·7	9·2	16·1	25·3	213·2	68	5·312
N.	Strand	49	1	172 *w*	299,808	40,883	1,126	29	29	58	258·2	6·6	7·1	13·7	237·7	50	7·333
N.	Holborn	49	1	196	231,875	42,556	1,253	22	72	94	313·0	5·2	16·9	22·1	217·1	53	5·449
N.	Clerkenwell	72	1	380	242,524	63,957	1,661	45	93	138	276·1	7·0	14·5	21·5	168·3	65	3·792
N.	St. Luke	48	1	220	186,452	56,710	1,487	46	75	121	313·3	8·1	13·2	21·3	257·8	51	3·288
N. E.	East London	‡	1	153	2,137,791	37,661	773	59	29	88	248·4	15·7	7·7	23·4	246·2	40	20·778
N.	West London	26 Aldermen 206 Common Councilmen		138 *w*		25,470	1,116	60	28	88	276·5	11·8	11·0	22·8	184·6	29	
N.	London City			434 *w*		39,756	659	20	15	35	222·3	5·0	3·8	8·8	91·6	31	

N. E.	Shoreditch - - - - - - - -	120	1	646	386,044	130,836	3,411	135	145	280	250·3	10·7	10·6	21·3	211·8	48	2·821
E.	Bethnal Green - - - - - - - -	48	1	760	192,116	110,289	3,824	614	181	795	368·6	60·4	16·4	76·8	145·1	38	1·742
E. N.	Whitechapel - - - - - - - -	58	1	406 w	277,748	76,386	3,499	900	123	1,023	387·0	84·0	16·1	100·1	188·1	32	3·636
E.	St. George-in-the-East - - - - - - -	36	1	243	196,745	47,779	1,877	387	82	469	417·6	87·9	17·2	105·1	196·6	21	4·118
E.	Stepney (Limehouse) - - - - - - -	36	1	576 w	234,804	56,198	1,849	557	111	668	375·1	107·6	19·8	127·4	97·6	11	4·178
E.	Mile End Old Town - - - - - - -	84	1	681	191,056	80,695	2,427	503	98	601	318·7	67·7	12·1	79·8	118·5	30	2·368
E.	Poplar - - - - - - - - -	48	2	2,918 w	344,320	99,762	3,687	835	187	1,022	362·1	90·8	18·7	109·5	34·2	8	3·451
	SOUTH DISTRICTS.																
S. L.	St. Saviour, Southwark - - - - -	39	1	250 w	164,000	36,422	910	32	38	70	253·8	7·4	10·7	18·1	145·7	3	4·503
S.	St. Olave, Southwark - - - - - -	28	1	169 w	110,700	18,914	947	20	19	39	260·1	8·5	10·0	18·5	111·9	4	5·853
S.	Rotherhithe - - - - - - - -	24	1	886 w	83,500	28,767	600	25	17	42	221·7	8·7	5·9	14·6	32·5	0	2·903
S. L.	Bermondsey - - - - - - - -	36	1	688 w	150,000	64,310	1,623	34	82	116	268·3	5·3	12·8	18·1	93·5	0	2·332
S. L.	St. George, Southwark - - - - - -	48	1	282	146,000	57,498	1,551	38	47	85	286·7	6·6	8·2	14·8	203·9	0	2·539
L. S.	Newington - - - - - - - -	72	1	624	240,000	92,680	2,240	26	53	79	235·7	2·8	5·7	8·5	148·5	—1	2·590
L. S.	Lambeth - - - - - - - -	116	1	4,015 w	637,000	174,904	4,173	114	180	294	253·6	6·5	10·3	16·8	43·6	3	3·642
S. L.	Wandsworth - - - - - - - -	57	5	11,695 w	361,400	82,979	2,075	40	67	107	265·8	4·8	8·1	12·9	7·1	24	4·355
S. L.	Camberwell - - - - - - - -	82	1	4,342	250,000	81,818	2,050	46	68	114	266·3	5·6	8·3	13·9	18·8	4	3·056
K. S.	Greenwich - - - - - - - - -	57	1	3,771 w	274,976	97,473	2,481	202	74	276	259·3	20·7	7·6	28·3	25·8	9	2·821
K.	Woolwich - - - - - - - - -	21	None	1,596 w	83,000	47,363	915	80	43	123	205·4	16·9	9·1	26·0	29·7	?	1·752
K. S.	*Greenwich Registration District* - - - -	*78*	*1*	*5,367 w*	*357,976*	*144,836*	*3,396*	*282*	*117*	*399*	*241·7*	*19·5*	*8·1*	*27·6*	*27·0*	*8*	*2·472*
K.	Plumstead and Charlton - - - - - -	37	4	11,806 w	183,850	67,047	933	44	35	79	147·9	6·6	5·2	11·8	5·7	?	2·748 §
L.	Lewisham - - - - - - - - -	27	1	5,418	227,410	23,373	487	11	9	20	221·5	4·7	3·9	8·6	4·3	89	6·663 ‖
K. L.	*Lewisham Registration District* - - - -	*64*	*5*	*17,224 w*	*411,260*	*90,420*	*1,420*	*55*	*44*	*99*	*166·9*	*6·1*	*4·9*	*11·0*	*5·2*	*28*	*4·548*

The areas marked thus (*w*) include water.

The several Water Companies are designated by letters, thus: the New River Company by N., the Grand Junction by J., Chelsea by C., West Middlesex by WM., East London by E., Hampstead by H., Southwark by S., Lambeth by L., and Kent by K. In cases where a district is supplied by more than one Company, the initial of the Company supplying the greater part is placed first. Where a Company supplies only a small part of the district, it is indicated by a small initial letter.

That part of Hackney District served by the East London Company is, it is believed, supplied from Lea Bridge after filtration. The East Districts are supplied principally from the reservoirs at Old Ford.

* In deducing the mortality from all causes in the several districts, the population and the deaths in the following hospitals were subtracted from the population and deaths of the respective districts in which the hospitals were situated; viz., St. Mary's, Paddington, inmates, 191; deaths, 191. Consumption, inmates, 218; deaths, 127. West London, inmates, 23; deaths, 13. St. George's, inmates, 376; deaths, 343. Westminster, inmates, 171; deaths, 174. Charing Cross, inmates, 102; deaths, 74. Middlesex, inmates, 320; deaths, 292. University College, inmates, 154; deaths, 211. Royal Free, inmates, 101; deaths, 129. Small-pox, inmates, 35; deaths, 260. London Fever, inmates, 44; deaths, 668. King's College, inmates, 164; deaths, 234. St. Bartholomew's, inmates, 788; deaths, 565. London, inmates, 405; deaths, 733. Guy's, inmates, 675; deaths, 541. St. Thomas's, inmates, 539; deaths, 197; and the "Dreadnought," inmates, 202; deaths, 108. The number of inmates returned are those enumerated at the census of 1861, but the accuracy of the results is not materially affected by adopting those numbers. The hospital population and deaths were then distributed proportionally over all the districts of the Metropolis. The workhouse of the district of St. Luke is in Shoreditch, the workhouse of the Strand is in St. Pancras, the workhouses of the City of London District are in Mile End Old Town and Poplar Districts, and so on for other outlying workhouses. In calculating the mortality of the respective districts from all causes, the deaths and population of these outlying workhouses were taken from those districts in which they happen to be situated, and placed to the districts to which the inmates belong.

† The following corrections have been made in calculating the cholera mortality of certain disstricts wherein hospitals are situate. The deaths in the London and Cholera Hospitals at Whitechapel of persons belonging to other districts have been distributed proportionally over each of the East London districts. The cholera mortality of the districts of St. George, Hanover-square, Marylebone, St. Saviour, and St. Olave, Southwark, Strand, Islington, West London, and Pancras, has been calculated on the deaths from cholera, *exclusive* of the deaths in the hospitals of persons brought from other districts.

‡ The Commissioners of Sewers are the Board for the City of London, and number about 80; the members of the Corporation, including the Aldermen, 232.

§ The annual value of property per head of population in Plumstead District is exclusive of Mottingham Hamlet. Under the provisions of the Metropolis Management Act, Mottingham is excluded from Plumstead, but for registration purposes it is included.

‖ The annual value of property per head of population in Lewisham District is inclusive of Penge Hamlet. Under the provisions of the Metropolis Management Act, Penge is included in Lewisham, but for registration purposes it is excluded.

Appendix, No. 7.

METEOROLOGICAL TABLE FOR LONDON, 1866.

(Deduced from Observations, at Greenwich, under the Superintendence of the Astronomer Royal, and compiled from Quarterly Tables, furnished to the Registrar General by James Glaisher, Esq., F. R. S.)

Winter - - Jan., Feb., March. Spring - - April, May, June. Summer - - July, Aug., Sept. Autumn - Oct., Nov., Dec.	Temperature of									Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.		Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Reading of Thermometer on Grass.				
	Air.			Evaporation.		Dew Point.		Air—Daily Range.														Number of Nights it was				
	Mean.	Diff. from Average of 95 Years.	Diff. from Average of 25 Years.	Mean.	Diff. from Average of 25 Years.	Mean.	Diff. from Average of 25 Years.	Mean.	Diff. from Average of 25 Years.	Mean.	Diff. from Average of 25 Years.	Mean.	Diff. from Average of 25 Years.	Mean (Satⁿ = 100).	Diff. from Average of 25 Years.	Mean.	Diff. from Average 25 Years.	Mean.	Diff. from Average of 25 Years.	Amount.	Diff. from Average of 51 Years.	At or below 30°.	Between 30° and 40°.	Above 40°.	Lowest Reading at Night.	Highest Reading at Night.
1866:	°	°	°	°	°	°	°	°	°	In.	In.	Gr.	Gr.	°	°	In.	In.	Gr.	Gr.	In.	In.				°	°
YEAR - - -	49·8	+1·3	+0·5	47·1	+0·5	44·2	+0·5	15·3	−0·6	·299	+·003	3·4	0·0	82	0	29·716	−0·063	540	−2	30·5	+1·0	74	129	162	16·2	58·5
Winter Quarter - - - -	41·2	+2·7	+1·7	39·1	+1·3	36·4	+1·0	12·5	+0·6	·216	+·009	2·5	0·0	84	−1	29·586	−0·185	547	−5	9·3	+4·5	39	39	12	16·2	49·6
Spring do. - - - -	53·0	+0·8	0·0	49·1	−0·1	45·3	−0·3	19·7	−0·1	·309	·000	3·5	0·0	76	−1	29·777	−0·004	538	−1	7·9	+0·7	9	43	39	26·0	56·9
Summer do. - - - -	58·9	+0·6	−1·1	55·6	−0·6	52·6	−0·2	17·2	−2·5	·398	−·006	4·5	0·0	80	+2	29·663	−0·145	529	−2	7·9	+0·5	0	6	86	33·1	58·5
Autumn do. - - - -	46·2	+2·4	+1·2	44·4	+1·4	42·4	+1·3	11·7	−0·2	·274	+·010	3·1	+0·1	87	−1	29·838	+0·083	546	+1	5·4	−1·7	26	41	25	21·0	54·3

In this Table, + and — respectively signify that the numbers in the *preceding* column are *above* or *below* the average to the extent of the quantities to which these signs are prefixed.

Sir, Royal College of Chemistry, 20 February 1867.

I HAVE the honour to lay before you a summary of the results obtained in my analyses of the metropolitan waters during the year 1866. These results are contained in the accompanying five tables, marked respectively A., B., C., D., and E.

Table A. records the amount of solid impurity left on evaporation and desiccation at 120°—130° C., (248°—266° F.) of 100,000 parts by weight of water. Table B., the loss which this solid matter suffered on incineration. Table C., the amount of oxygen required to oxidize the organic matter contained in 100,000 parts of the water; and Table D., the degrees of hardness, or parts of carbonate of lime (or its equivalent of other hardening salts) contained in the same weight of water. Thus in January 1866 we find, on referring to Table A., that 100,000 lbs. of the water delivered to consumers by the Chelsea company contained 30·12 lbs. of solid impurity, of which, as shown by Table B., 1·44 lb. was driven off by incineration. From Table C. we learn that ·1184 lb. of oxygen was required to oxidize the organic matter in 100,000 lbs. of the said Chelsea water; whilst from Table D. we find that 21·4 lbs. out of the 30·12 lbs. of total solid impurity consisted of carbonate of lime or other soap-destroying material, which communicates to all the water delivered in London its excessive hardness.

Table E. exhibits a comparison between the years 1865 and 1866, as regards the composition and properties of the waters supplied to the metropolis. From this table it will be seen that, with two exceptions, the New River and South Essex, all the waters were harder, and contained more solid impurity in 1866 than in 1865. The water delivered by the New River Company was softer, and contained less solid impurity, whilst the South Essex Company's water contained less solid impurity, but was harder in 1866 than in 1865. With one exception, the organic and other volatile matter was in every case markedly less in 1866 than in 1865. The exception is the water of the New River Company, which exhibits a very slight excess of this matter in 1866 as compared with the previous year. The amount of oxygen required to oxidize the organic matter contained in the waters was also less in 1866 than in 1865, with two exceptions, viz., in the New River and South Essex Companies' waters. It must be remarked, however, that in this respect the Kent, South Essex, and New River Companies' waters are greatly superior to those of all the other companies in both years.

I have, &c.
(signed) *E. Frankland.*

The Registrar General,
&c. &c. &c.

TABLE A.

SOLID MATTER in 100,000 parts of the WATERS.

NAMES OF COMPANIES.	1866.												
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
THAMES.													
Chelsea - - -	30·12	31·14	28·55	28·64	26·78	25·25	25·40	24·89	24·63	27·54	30·46	31·72	27·92
West Middlesex -	32·02	30·40	28·50	27·69	26·85	24·82	24·72	23·62	24·15	26·38	30·01	29·90	27·42
Southwark - -	29·90	30·90	29·20	29·49	27·32	24·74	25·25	23·66	24·09	28·18	30·71	31·18	27·88
Grand Junction -	30·70	31·40	29·60	29·38	27·06	24·82	25·14	25·00	25·21	28·97	30·74	30·74	28·23
Lambeth - -	27·10	31·16	27·98	28·62	27·13	26·63	25·25	25·51	25·00	28·58	30·84	30·13	27·82
OTHER SOURCES.													
Kent - - -	37·70	37·92	39·80	39·02	39·98	39·28	40·42	38·88	38·60	39·28	39·59	37·99	39·03
New River - -	29·92	29·50	29·85	27·28	25·39	21·55	20·58	20·20	20·37	26·50	29·09	17·92	24·85
East London - -	35·15	32·78	33·60	30·45	35·09	26·22	24·38	26·14	26·25	30·20	31·18	34·34	30·48
South Essex - -	40·59	40·60	40·40	39·66	39·68	38·52	40·94	38·04	38·46	38·94	38·11	31·32	38·77
Columns - -	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.

TABLE B.

ORGANIC and other VOLATILE MATTER in 100,000 parts of the WATERS.

NAMES OF COMPANIES.	1866.												
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
THAMES.													
Chelsea - - -	1·44	2·59	1·25	1·02	0·74	0·85	1·57	1·29	0·66	0·70	1·32	1·08	1·21
West Middlesex -	1·80	2·00	1·40	1·23	0·86	0·97	1·58	1·16	0·88	0·72	1·32	1·24	1·26
Southwark - -	1·85	2·40	1·40	1·59	1·55	0·93	1·55	0·98	0·63	1·30	1·03	1·10	1·36
Grand Junction -	1·65	1·60	1·55	1·77	0·84	0·91	1·26	1·09	0·56	0·79	1·48	0·87	1·19
Lambeth - -	1·94	1·65	1·33	1·96	0·90	1·01	1·71	1·53	0·91	1·70	1·30	1·19	1·43
OTHER SOURCES.													
Kent - - -	1·26	1·80	1·40	0·88	1·08	1·50	1·58	1·80	0·64	1·40	1·63	1·11	1·34
New River - -	1·30	1·68	1·92	1·79	0·53	0·91	0·58	0·89	0·78	0·71	0·71	0·88	1·05
East London - -	2·24	1·68	1·20	2·26	0·63	1·26	1·94	1·44	0·55	1·25	0·98	1·63	1·42
South Essex - -	1·69	1·36	2·10	1·40	1·98	1·66	1·96	1·80	1·21	0·98	1·00	1·48	1·55
Columns - -	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.

Appendix, No. 7.

TABLE C.

AMOUNT of OXYGEN required to oxidize ORGANIC MATTER in 100,000 parts of the WATERS.

NAMES OF COMPANIES.	1866.												
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
THAMES.													
Chelsea - - -	·1184	·0912	·0564	·0608	·0372	·0360	·0504	·0344	·0340	·0834	·0589	·0543	·0596
West Middlesex -	·0336	·0739	·0684	·0404	·0344	·0360	·0516	·0304	·0373	·0730	·0748	·0599	·0511
Southwark - -	·0568	·0643	·0496	·0628	·0600	·0420	·0596	·0336	·0315	·0670	·0866	·0629	·0564
Grand Junction -	·0627	·0555	·0484	·0620	·0404	·0368	·0546	·0368	·0323	·0761	·0790	·0540	·0532
Lambeth - -	·1288	·0592	·0992	·0548	·0452	·0424	·0560	·0368	·0467	·0804	·0760	·0599	·0654
OTHER SOURCES.													
Kent - - -	·0096	·0104	·0092	·0070	·0072	·0076	·0097	·0084	·0073	·0082	·0110	·0199	·0096
New River - -	·0152	·0576	·0392	·0308	·0280	·0252	·0212	·0133	·0128	·0258	·0228	·0299	·0268
East London - -	·0291	·0636	·0548	·0624	·0328	·0264	·0344	·0328	·0262	·0425	·0657	·0987	·0474
South Essex - -	·0096	·0086	0·108	·0070	·0114	·0080	·0120	·0108	·0587	·0098	·0083	·0111	·0138
Columns - -	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.

TABLE D.

DEGREES of HARDNESS (1 deg. = 1 part of Carbonate of Lime, or its equivalent,) in 100,000 parts of the WATERS.

NAMES OF COMPANIES.	1866.												
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean.
THAMES.													
Chelsea - - -	21·4	21·1	19·4	21·9	21·1	16·5	16·5	17·4	18·0	18·5	21·1	18·5	19·3
West Middlesex -	21·4	19·8	19·7	21·4	21·7	16·2	16·2	16·2	17·2	19·1	21·4	19·1	19·1
Southwark - -	20·2	20·7	21·0	22·6	21·4	15·7	16·5	16·2	16·8	20·0	21·4	19·4	19·3
Grand Junction -	21·1	22·2	20·7	22·8	20·8	16·2	17·1	16·8	18·0	20·2	21·7	19·1	19·7
Lambeth - - -	15·4	21·0	18·5	20·5	21·1	16·8	16·2	17·2	17·4	20·0	22·0	18·2	18·7
OTHER SOURCES.													
Kent - - -	26·5	27·4	27·7	28·5	29·7	25·4	24·5	24·8	26·5	27·4	26·2	23·4	26·5
New River - -	23·7	22·0	22·5	22·7	21·4	13·7	13·4	13·7	14·0	18·5	20·8	14·2	18·4
East London - -	24·8	23·1	25·1	22·8	20·8	15·7	16·0	17·7	17·1	20·2	21·7	20·0	20·4
South Essex - -	25·7	26·5	27·4	27·4	28·5	23·1	23·4	22·2	24·8	25·8	23·7	22·5	25·1
Columns - -	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.

TABLE E.

COMPARATIVE RESULTS in Years 1865 and 1866.

NAMES OF COMPANIES.	Year.	TOTAL SOLID IMPURITY.			ORGANIC and other volatile Matter.			OXYGEN required to oxidize organic Matter.			HARDNESS.		
		Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
THAMES.													
Chelsea - - -	1865	31·72	23·58	26·44	3·05	·72	1·50	·1942	·0328	·0794	18·1	14·5	16·3
	1866	31·72	24·63	27·92	2·59	·70	1·21	·1184	·0340	·0596	21·4	16·5	19·3
West Middlesex -	1865	30·63	22·42	26·43	3·07	·96	1·57	·1076	·0304	·0581	18·7	17·1	17·7
	1866	32·02	23·62	27·42	2·00	·72	1·26	·0748	·0304	·0511	21·7	16·2	19·1
Southwark - -	1865	32·62	18·78	26·89	3·40	·84	1·77	·1972	·0408	·0791	18·9	16·4	17·7
	1866	31·18	23·66	27·88	2·40	·63	1·36	·0866	·0315	·0564	22·6	15·7	19·3
Grand Junction -	1865	32·11	22·94	26·97	2·72	·81	1·54	·1722	·0352	·0636	18·4	16·4	17·7
	1866	31·40	24·82	28·23	1·77	·56	1·19	·0790	·0323	·0532	22·8	16·2	19·7
Lambeth - -	1865	31·36	22·76	26·41	2·70	·97	1·61	·1950	·0392	·0818	18·8	16·4	17·6
	1866	31·16	25·25	27·82	1·96	·90	1·43	·1288	·0368	·0654	22·0	15·4	18·7
OTHER SOURCES.													
Kent - - -	1865	39·60	34·92	37·79	2·66	·61	1·65	·0692	·0048	·0149	27·4	23·7	25·6
	1866	40·42	37·70	39·03	1·80	·64	1·34	·0199	·0070	·0096	29·7	23·4	26·5
New River - -	1865	30·02	19·40	25·24	2·00	·54	·98	·0496	·0096	·0251	21·1	17·2	19·3
	1866	29·92	20·20	24·85	1·92	·53	1·05	·0576	·0128	·0268	23·7	13·4	18·4
East London - -	1865	34·62	22·17	27·98	3·30	·86	1·62	·1341	·0188	·0504	22·2	17·4	20·2
	1866	35·15	24·38	30·48	2·26	·55	1·42	·0987	·0262	·0474	25·1	15·7	20·4
South Essex - -	1865	43·36	37·68	40·28	2·70	·84	1·82	·0160	·0048	·0103	26·5	21·1	24·2
	1866	40·94	31·32	38·77	2·10	·98	1·55	·0587	·0070	·0138	58·5	22·2	25·1

Appendix, No. 8.

CHOLERA IN LONDON, 1848-49.

Appendix, No. 8.

EXTRACTS from DR. FARR'S REPORT to the REGISTRAR GENERAL on CHOLERA in *England*, 1848–49.

1. THE THAMES AND THE WATER SUPPLY OF LONDON.

THE Thames collects the waters of 6,160 square miles of country, extending from the Cotswold Hills in Gloucestershire to the eastern coast; and the great body of this water flows and reflows through London in tides, which carry the matter below London Bridge a mile and a half above Battersea Bridge twice a day, and ascend as high as Teddington. The contents of the greater part of the drains, sinks, and water-closets of this vast city, and of the 2,360,000 people on its sides, are discharged through the sewers into its waters, which, scarcely sullied by the primitive inhabitants, have now lost all their clearness and purity. The dark, turbid, dirty waters from half stagnant sewers are agitated by the tides, but are not purified until they reach the sea.

The Thames presents a large evaporating surface which must be taken into account, and it gives off vapours day and night in quantities which the phenomena of a "London fog" reveal. The still air then condenses the matter which at other times enters the atmosphere invisibly and escapes observation. The mean lowest night temperature of the Thames from May 27th to September 15th, 1849, was 64°; the mean lowest night temperature of the air was 52°; so that the wide simmering waters were breathing incessantly into the vast sleeping city tainted vapours, which the temperature of the air at night would not sustain.

It is a fact well worthy of attention that after the temperature of the Thames has risen above 60°, diarrhœa, summer cholera, and dysentery become prevalent, and disappear as the temperature subsides. The cholera reached London in the new epidemic form about October 1848; it prevailed through the winter and destroyed 94 lives in the second week of January, when the temperature of the Thames was 37°; it declined rapidly through April and May; the night temperature of the Thames then rose to 62° in the week ending June 2nd; with some fluctuations it went up to 68° in July, and remained above 60° until the middle of September (week ending September 15th). The deaths from cholera registered during each of the 16 weeks were 9, 22, 42, 49, 124, 152, 339, 678, 783, 926, 823, 1,230, 1,272, 1,663, 2,026, 1,682. The mean night temperature of the Thames fell to 56°; the deaths from cholera to 839 in the week September 16–22; the temperature gradually fell to 38 on the last week of November, when there was only one death from cholera registered.

The mortality from cholera increases generally in descending the river on the south side; in Wandsworth it was at the rate of 100 in 10,000 inhabitants; in Lambeth, 120; St. Saviour, 153; St. Olave, 181; Bermondsey, 161; Rotherhithe, 205, where the water was perhaps most impure; Greenwich, 75, where it had lost some of its impurities.

On the north side, commencing at the highest part of the river, the mortality from cholera was, in Kensington, 33; Chelsea, 46; Belgravia, 28; Westminster, 68; St. Martin-in-the-Fields, 37; Strand, 35; West London (on the old Fleet Ditch), 96; London City, 38; East London, 45; Whitechapel, 64; St. George-in-the-East, 42; Stepney, 47; Poplar, 71. The mortality from cholera in the three sub-districts of Stepney, adjoining the Thames, was twice as great as in the two districts away from the river. The result is here disturbed by elevation. No good analysis has been made of the Thames water at different parts of its course; but the matter in suspension is perhaps greatest between London Bridge and Limehouse Reach, against Rotherhithe.

The seven districts of London in which the mortality is highest from ordinary causes are, the West London District (between Smithfield and the Thames), St. Saviour, Whitechapel, St. George-in-the-East, Chelsea, St. Olave, and Rotherhithe. They all adjoin the Thames.

Mr. Glaisher, of the Royal Observatory, Greenwich, was requested to make an estimate of

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of the amount of vapour raised by evaporation from the Thames in London, and favoured the Registrar General with the subjoined statement:—

> " For some years past I have made daily experiments upon the amount of water evaporated from a surface of water, and the amount exceeded 30 inches annually.
>
> " A depth of water of fully 30 inches must evaporate from the surface of the Thames annually; indeed the quantity must be larger than this from the circumstance of its relative high night temperature. Take it, however, at 30 inches, and we shall have—
>
> $2{\cdot}5 \times 9 \times 4840 = 108{,}900$ *cubic feet* evaporated in a year from an area of water of one acre.
>
> $\frac{108900}{0{\cdot}1605} = 678{,}505$ *gallons* of water evaporated in one year from an acre of water.
>
> $108{,}900 \times 2245 = 244{,}480{,}500$ cubic feet of water evaporated from a surface of 2,245 acres of water in one year.
>
> $\frac{244480500}{0{\cdot}1605} = 1{,}523{,}242{,}991$ gallons of water evaporated in one year from a surface of water of 2,245 acres in extent, or more than 1,523 millions of gallons. The salt water affects the water at Woolwich; it is usually what is termed brackish there. Lieutenant Sanders states that at Greenwich, at high-water spring tides, the water is frequently brackish.
>
> " The dirt and filth in solution must be very large. The 'Dreadnought' experiments are made under my direction chiefly, and I can assure you that to read the instruments is a serious affair, owing to the filth of the waters. On first pulling them up they are covered with a slimy adhesive mud; they first have to be wiped, and if the wind is blowing strongly, this muddy water is blown about and over the observer. A new trunk is now being made, with a perforated copper bottom turning downwards upon hinges, so as to get rid of the enormous deposit."

Upon Mr. Glaisher's estimate, 678,505 gallons evaporate from an acre of water in a year, which is at the rate of 1857·6 gallons daily. The bed of the Thames in London is estimated approximately at 2,245 acres; consequently 4,170,000 gallons are raised from the Thames on an average daily through the year. The quantity evaporated at low water is, perhaps, much less than this; on the other hand, the evaporation in summer is more active than in winter, and the proportion of decomposing organic matter in the water and on the banks exposed to evaporation is greater at low than at high water. Hence it is probable that in summer 4,000,000 gallons, or about 18,000 tons of water, are raised from the polluted Thames daily and discharged into the atmosphere which is breathed by the inhabitants of London. It remains to determine how much of the organic matter in the water is raised with the vapour at different temperatures.

London derives its supply of water for washing, cleansing, cooking, and drinking, to a small extent from wells; 18 districts have supplies from the River Amwell and from the Lea, a tidal tributary of the Thames; two districts from the Ravensbourne; and 18 districts from the Thames, at five points of its course. The water is generally pumped by steam-power into water-butts or reservoirs in the houses, at intervals of one, two, or three days. As the water is of very different degrees of impurity, it will now be right to state the fatality of cholera in the several water districts of London, arranged under the companies by which the water is furnished.

Grand Junction Company.—The *waters of the Thames at Kew* chiefly supply the sub-districts of Paddington, Hanover-square, and May Fair, and the greater part of the district of St. James, Westminster. The mortality from cholera was at the rate of 8 in 10,000 inhabitants.

West Middlesex Company.—The *waters of the Thames at Hammersmith* supply Marylebone and a small part of Hampstead. The mortality from cholera was at the rate of 17 in 10,000 inhabitants in Marylebone. In Hampstead the mortality was 8 in 10,000.

Chelsea Water Company.—The *waters of the Thames at Battersea*, much below Battersea Bridge and below the Chelsea Hospital, supply the Belgrave sub-district of St. George Hanover-square, and the districts of Chelsea and Westminster. The mortality from cholera was at the mean rate of 47 in 10,000 inhabitants; in the Belgrave sub-district the deaths from cholera were 28; in Chelsea, 46; in Westminster, 68 in 10,000 inhabitants.

Southwark Water Company.—The *waters of the Thames at Battersea*, still lower down the river, supply the districts of Wandsworth, St. Olave, and Bermondsey. The mortality from cholera was at the rate of 147 in 10,000. In Wandsworth the mortality was 100; in St. Olave, 181; in Bermondsey, 161 in 10,000.

Lambeth Water Company and Southwark Water Company.—The *waters of the Thames* between *Waterloo Bridge and the Hungerford Suspension Bridge*, supply parts of the districts of Lambeth, St. Saviour, St. George Southwark, Newington, and Camberwell; the other parts of these districts being supplied from Battersea by the Southwark Company. The mortality from cholera was at the rate of 136 in 10,000. In the district of Lambeth the mortality was 120; St. Saviour, 153; St. George Southwark, 164; Newington, 144; Camberwell, 97 in 10,000.

Southwark and East Kent Water Companies.—Rotherhithe is supplied with *water partly by the Thames at Battersea and by the Ravensbourne*, and partly from ditches and wells, into some of which the drains and cesspools soak. The mortality from cholera was at the rate of 205 in 10,000 inhabitants.

East London Water Company.—The Lea supplies the districts of Poplar, Stepney, Bethnal Green, St. George-in-the-East, and Whitechapel with water. The mortality from cholera was at the rate of 63 in 10,000 inhabitants; and 71, 47, 90, 42, and 64 in each of the five districts.

New River Water Company.—The Amwell and the Lea supply Islington, St. Luke, Clerkenwell, London City, West London, East London, Holborn, St. Giles, the Strand, St. Martin-in-the-Fields. The mean mortality from cholera was at the rate of 41 in 10,000 inhabitants; the mortality was least in Clerkenwell (19), near the head reservoir; greatest (96) in West London, on the edge of the Thames.

Kent Water Company.—The waters of the Ravensbourne supply Greenwich, where the mortality from cholera was 75 in 10,000 inhabitants; and parts of Lewisham, where the cholera was at the rate of 30, in 10,000 inhabitants.

Two or more companies supply some districts. The district of St. James, Westminster, is supplied by the Kew and the New River waters; the mortality from cholera was 16 in 10,000 inhabitants. Kensington is supplied by the West Middlesex, the Chelsea and the Grand Junction Companies; the mortality from cholera was 33 in 10,000. St. Pancras is supplied by the New River, Hampstead, and the West Middlesex Companies; the mortality from cholera was 22 in 10,000. Shoreditch and Hackney are supplied by the New River and the East London Companies; the mortality in the two districts from cholera was 76 and 25 in 10,000.

Arranging the groups of districts in the order of mortality, it appears that the mortality from cholera was lowest in districts which have their water chiefly from the Thames so high in its course as Hammersmith and Kew. Upon the other hand, the mortality was greatest in the districts which derive their water from the Thames so low down as Battersea and the Hungerford Bridge. The districts of the New River occupy an intermediate station.

In the six districts which are supplied with water taken from the Thames at Kew and Hammersmith, 15 in 10,000 inhabitants died from cholera; and the mortality ranged from 8 to 33.

In the 20 districts which are supplied with water from the Amwell, the Lea, and the Ravensbourne, 48 in 10,000 inhabitants died of cholera; and the mortality ranged from 19 to 96.

In the 12 districts which are supplied with water taken from the Thames between Battersea and the Waterloo Bridge, 123 in 10,000 inhabitants died of cholera; and the mortality ranged from 28 to 205.

In the second group of districts cholera was three times as fatal; in the third, eight times as fatal as it was in the first: 1, 3, and 8, express the relative virulence of the epidemic in the three conditions. The density of the population was greatest in the central group, and nearly the same in the first and third group.

London Group of Districts.	Deaths from Cholera to 10,000 Persons Living.	Density of Population (Persons to an Acre).	Elevation in Feet above High-water Mark (Trinity).	Annual Value of Houses (Year ending 5th April 1843).
6 Districts supplied with water taken from the Thames *above* Battersea - - - -	15	72	105	£. 82
20 Districts supplied with water from the New River, the Lea, and the Ravensbourne - - - -	48	137	42	44
12 Districts supplied with water taken from the Thames, between Battersea and Waterloo Bridges -	123	73	5	31

Cholera Report, 1848–9, pp. lviii–lxi.

2. Theory of the Propagation of Cholera.

Jameson, in the last page of the Supplement to his admirable "Report on Cholera in Bengal," after noticing that some of the natives placed "great faith in *boiled water* as a preventive," and that one of the principal native gentlemen of Calcutta ascribed the "singular healthiness of his numerous household to his having taken the simple precaution of allowing no water to be drunk by them until it had been previously boiled," adds: "*Bad water, no doubt, sometimes immediately induces the disorder*: but we must not suppose it is the sole cause of it."* This is borne out by some observations in the Indian Reports, where,

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* Report on Cholera Morbus in Bengal, by James Jameson, p. 324, Supplement.

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where, however, the sources of the water supply are too seldom referred to, although a popular belief prevails in many countries of India that it is the water which produces ague and remittent fever.* Dr. Barnes, who had medical charge of the district of Jessore, in Bengal, from 1810 to 1822, but who was absent in part of the years 1816 and 1817, when the disease assumed the epidemic character, stated in 1831 that he had been intimately acquainted with the disease as an endemic. He had considered it from the first as a disease peculiar to that country, and previously unknown, which had superseded the periodical remittent fever formerly so prevalent. If the annual storms of violent thunder, lightning, wind, and rain commenced early in March, and recurred at short intervals until the rainy season began, the hot season (April, May, June) was, he says, comparatively healthy, and conversely: if the rains broke up at the end of August, and the waters sank rapidly during September, the cholera commenced its attack at the beginning of October, carrying death and desolation among the inhabitants until the middle of December, when the disease in a short time became apparently extinct. Instead of the usual rainy and dry season, scarcely a week of 1816, in Jessore, was without rain; the sun was constantly obscured; the atmosphere close, heavy, moist: the thermometer from March to November ranging between 70° and 95 . The crowded, ill-ventilated native huts are on mounds surrounded with pits, which are the receptacles of stagnant water and of every kind of filth. Dr. Barnes asserts unhesitatingly that in these circumstances the Asiatic epidemic was generated from the *exhalations* arising from the decomposition of *animal and vegetable matter* and the *use of water in which this process was continually going on.* "These," he emphatically declares, "were the *sole causes of the disease.*"†

"In the autumn of 1849, Dr. Brittain and Dr. Swayne, of Bristol, considered that they had discovered the cause of cholera in a *minute fungus*; and Dr. W. Budd, of the same city, met with the supposed fungus in various specimens of water used as drink in places where the cholera was very prevalent."‡ Upon further investigation the supposed fungi were, by experienced microscopists, pronounced to be other matters; and after the able Report of the Committee of the London College of Physicians, the hypothesis was generally abandoned.

Dr. Snow, in a paper dated 29th August 1849, advanced the theory of the pathology of cholera; and it is in many respects the most important theory that has yet been propounded. Dr. Snow, after endeavouring, in a subsequent paper, to show that the disease is propagated by human intercourse, and that it is a local affection of the alimentary canal, thus states his doctrine:—

"The induction from these data is that the disease must be caused by something which passes from the mucous membrane of the alimentary canal of one patient to that of the other, which it can only do by being swallowed; and as the disease grows in a community by what it feeds upon, attacking a few people in a town first, and then becoming more prevalent, it is clear that the cholera poison must multiply itself by a kind of growth, changing surrounding materials to its own nature, like any other morbid poison; this increase is the cause of the *materies morbi* of cholera taking place in the alimentary canal.

"The instances in which minute quantities of the ejections and dejections of cholera patients must be swallowed, are sufficiently numerous to account for the spread of the disease; and on examination, it is found to spread most where the facilities for this mode of communication are greatest. Nothing has been found to favour the extension of cholera more than want of personal cleanliness, whether arising from habit or scarcity of water, although the circumstance hitherto remained unexplained. The bed linen nearly always becomes wetted by the cholera evacuations, and as these are devoid of the usual colour and odour, the hands of persons waiting on the patient become soiled, and unless these persons are scrupulously cleanly in their habits, and wash their hands upon taking food, they must accidentally swallow some of the excretion, and leave some on the food they handle or prepare, which has to be eaten by the rest of the family, who, amongst the working classes, often have to take their meals in the sick room. Hence the thousands of instances in which, amongst this class of the population, a case of cholera in one member of the family is followed by other cases; whilst medical men and others, who merely visit the patients, generally escape.

"With only the means of communication which we have been considering, the cholera would be constrained to confine itself chiefly to poor and crowded dwellings, and would be continually liable to die out accidentally in a place for want of the opportunity to reach fresh victims; but there is often a way open for it to extend itself more widely, and that is by the mixture of the cholera evacuations with the water used for drinking and culinary purposes, either by permeating the ground and getting into wells, or by running along channels and sewers into the rivers."*

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* *See* Bishop Heber's Indian Journal, ed. 1843, chap. xvii., p. 253. In a previous page (251) is a good description of the depressing and degrading effects of malaria on man.

† Letter addressed to Dr. Roupell, Dr. Babington, H. Field, Esq., and J. Ridout, Esq., members of the London Board of Health, dated 12th November 1831, published in M'Culloch and Maclaren on Cholera, pp. 26-35, 1850.

‡ Dr. Snow on Cholera; Paper read at the Epidemiological Society, 1851.

Dr. Lloyd, on 30th August 1849, at a meeting of the South London Medical Society, adduced instances of the great mortality from cholera of people living in Silver-street and Charlotte-place, Rotherhithe, who got their water from a well and a ditch into which the privies discharged their contents. The disease was much more fatal in the parts of Rotherhithe where ditch-water was used than it was in places which had their supply from the waterworks. Dr. Snow has collected examples in the South London districts where the water, being derived from deep wells, few cases of cholera occurred; and other instances of a great fatality among people living in houses, such as those in Wandsworth-road, where the contents of the waterclosets found their way into the water. He shows, from a communication by Dr. Shapter, that in 1832 Exeter was supplied with water taken from the streams of the Exe, into which the sewers emptied themselves; and that subsequently waterworks were established on the river, two miles above the town, and more than two miles above the tidal range. In three months of 1832, cholera destroyed 347 lives in Exeter; in 1849 it was only fatal to 44 persons, many of them strangers, who died within three days of their arrival. An opposite instance is afforded by Hull, which in 1832 was scantily supplied with water from springs at Anlaby, three miles distant. About seven years since waterworks were established on the River Hull, two miles and three-quarters above its confluence with the Humber, and afford the town a plentiful supply; but half the sewage of the town is delivered into the waters of the River Hull, half into the Humber; the tide flows up the river many miles past the waterworks, and carries with it the contaminated liquids of the sewers. In 1832 the cholera was confined almost exclusively to the poor, and the deaths amounted to about 300; in 1849 the deaths were 1178, and occurred among all classes of persons.† Negative and positive instances in other towns are cited by Dr. Snow, and in their reports to the Board of Health by Dr. Sutherland and Mr. Grainger.

Dr. Snow's theory of the propagation of Asiatic cholera in London is very simple. The cholera matter was brought to London by patients from Hamburgh; it was multiplied in the intestines of infected people until the disease spread in this way all over the metropolis. It necessarily implies that the rice-water discharges of the cholera patients may, under the present system of water supply, be distributed unchanged to nearly every house in London where water is used for drink, ablution, and washing. Dr. Snow is unfortunately able to show that this excremental distribution, almost too revolting and disgusting to write or read, is possible to a very considerable extent.‡ The sewers of London run into the Thames and the Lea, from which a part of the water supply is derived. The water, which the inhabitants of London have but the repulsive alternative to discuss in words or to use in fact, is, however, baled from the ditches only by the wretched inhabitants of such parts as Jacob's Island. It is in one case, before distribution, pumped up to a distant reservoir at Brixton; in other cases it is taken higher up the rivers, largely diluted, or beyond the reach of any but casual contamination; filtration is employed; chemical action, as the chemists on behalf of their wealthy clients tell us, is incessantly going on, and converting impurities into simple elements, so that it is only in some places, or in rare circumstances, that the organic waste can reach and injure the people. Still, in this mitigated form, the risk is too tremendous to be incurred by two millions and a half of the people, who require and can obtain an abundance of sweet water.

The supply of Paris is from various sources, but four-fifths of the water is from the Canal de l'Ourque, which, by the decision of Napoleon, was also appropriated to navigation. The water for some years, and in 1832, when the first epidemic was so fatal, was drawn from the dirty basin in which the boats and barges of the canals rested, but is now drawn from the canal before it enters the basin. The water in the Regent's Canal round London, and in the Cumberland Basin, Regent's-park, present a pretty faithful image of the waters of the Canal de l'Ourque, which flow from the fountains and supply the wants of the Parisians. The water in the Cumberland Basin is described by Dr. Milroy as "in a most offensive state, and indeed no better than that of a stagnant putrid ditch; and a great deal of choleraic disease prevailed among the men who were employed in the barges, and most of the families living in the houses on the wharves were more or less affected."§ The mortality of cholera in Paris was excessive, and in 1832 varied from 80 of 10,000 inhabitants in the elegant Chaussee d'Antin and in Montmartre on the heights, to 530 and 520 in the low quartiers of the Hôtel de Ville and the Cité.‖ The experience of Paris then, as well as of many of our own towns, lends some countenance to Dr. Snow's theory.

Cholera Report, 1848–9, pp. lxxvi—lxxviii.

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* "On the Pathology and Mode of Communication of Cholera," by John Snow, M.D. (Paper reprinted from the London Medical Gazette, pp. 2, 3.)

† Dr. Snow, pp. 7, 8. The numbers of deaths in 1849 are from the present returns.

‡ "On the Communication of Cholera," by J. Snow, M.D., pp. 23–26.

§ Report of General Board of Health on Cholera, p. 48.

‖ Etudes sur la Ville de Paris, par Horace Say, pp. 384–422, 481, and maps. And Rapport du Choléra dans Paris, 1834.

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3. The Zymotic Principle of Cholera.

It may, I think, be admitted that the disease Asiatic cholera is induced in man by a certain specific matter, and as it has been proposed to call the matter varioline which causes small-pox, so *cholrine* may designate the zymotic principle of cholera. A variety of that matter was produced in India in certain unfavourable circumstances; it had the property of propagating and multiplying itself in air, or water, or food, and of destroying men by producing in successive attacks the series of phenomena which constitute Asiatic cholera.

That *cholrine* is an organic matter cannot, I think, be doubted by those who have studied the whole of its phenomena and the general laws of zymotic disease. The great questions remain :—Is cholrine produced in the human organization alone and propagated by excreted matter? Is it produced and propagated in dead animal or vegetable matter, or mixed infusions of excreta and other matter out of the body? Is it propagated through water, through air, through contact, or through all these channels?

Observations sufficiently exact to decide these questions definitively have yet to be made and discussed on the principles of probability. The decisive facts cannot be investigated by experiments in which human life may be exposed to risk. They must be carefully looked for and noted by good observers. Conflicting theories serve, among other purposes, to direct the attention of observers to important points which they may otherwise neglect.

Cholera Report, 1848–9, p. lxxx.

4. Precautions against Cholera in regard to Water.

The precautions to take against cholera, in regard to *water,* are well stated by Dr. Snow; and they are of so simple a nature that, considering all the facts, no person can prudently neglect them.*

(*a.*) Water into which sewers flow, or which is navigated by persons living in boats, or which is in any other way contaminated by the contents of drains or cesspools, should be entirely disused.

[To warn any class of men against the use of unclean excremental water, even filtered, may appear useless. But it is now known that it enters into the supply of some of the principal cities of Europe, and contaminates the *eau sucrée* of Paris as well as the house water of London. The disagreeable revolting nature of this truth has probably been a cause of its suppression, and the consequent perpetuation of an insufferable nuisance.]

(*b.*) Hand-basins and towels, with sufficient water, should always be in readiness in the sick person's room, where every one should observe strict cleanliness; nurses and other people should invariably wash their hands before touching food.

(*c.*) The healthy should be separated from the sick, and be removed to another abode when they have no place but the sick-room in which to prepare and take their meals.

(*d.*) Soiled linen should be immersed in water until it can be scalded and washed; for if it should become dry, the matter might be wafted about in the form of dust. [The washing of the linen of cholera patients in the ordinary way is apparently not unattended with danger.]

The sanitary value of pure water, as well as the danger of habitually using water holding organic matter of any sort in solution, has been known from the earliest period. Instinct and science hallow springs and streams of living water. It is a difficult engineering task to place an adequate supply of fresh water within the reach of every householder in the large towns; but the task is of such vital importance that it cannot be neglected, and the mission of bringing it within the range of the municipal institutions of London, Paris, and every city, is too beneficent to be overlooked by statesmen. ' The quality of the best water is only to be discovered by experience, and may be learnt with sufficient accuracy from analyses of the waters of the salubrious fields.

Cholera Report, 1848–9, pp. ci, cii.

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* Slightly altered from Paper on Cholera, by J. Snow, M.D., p. 23; read 5 May, 2 June 1851, before the Epidemiological Society.

Appendix, No. 8.

CHOLERA IN LONDON, 1853–54.

EXTRACTS from Dr. *Farr's* LETTER to the REGISTRAR GENERAL on the Cholera Epidemic of 1853-54.

IMPURE WATER.

INDEPENDENTLY of any regard to theory, it appeared to be desirable to determine the effects of the different waters on the population of London during the impending cholera epidemic; accordingly the following circular was addressed by Mr. Mann to the secretaries of the several Water Companies:—

Sir, General Registry Office, 13 October 1853.

THE Registrar General will feel obliged if you will answer the accompanying inquiries for the public information.

I have, &c.

To the Secretary of __________ Water Company. (signed) *T. Mann.*

1. What is the source from which the Water Company obtains the water for the supply of the London districts? If wholly or partly from a river or running stream, state at what point the supply is taken.
2. Is it the same as it was in 1849?
3. Are the methods of filtration and purification the same as those in use in 1849?
4. Is the area of supply the same?
5. If any changes have been made in either of the above particulars, what are the date and nature of those changes?
6. If any change is contemplated in the existing arrangements, what is its nature, and when is it likely to come into operation?

A detailed abstract of the answers of the secretaries was published in a supplement to the Weekly Return, No. 47, 19th November 1853; and the general result was thus summed up:—

From the returns received from the Water Companies it appears that cholera finds London, as regards water, in the situation in which it left it. This holds true with reference to all except the Lambeth Waterworks Company, who changed their source of supply nearly two years ago from Lambeth to Thames Ditton; and from a Table subjoined it will be seen that the results of the present epidemic in the districts supplied by that company, as compared with some others, are rather more satisfactory than they were in 1849, an improvement which, it is hoped, in the further course of events will be maintained. But new works undertaken by other companies in accordance with recent legislation are in progress. The return of cholera at an earlier period than was anticipated furnishes a motive for increased activity in their operations. With capital, public spirit, and natural advantages of locality, London may enjoy a pure and copious supply of this first necessary of life, as well as country towns and villages, and more than some towns with municipal institutions where the burgesses are too idle or too busy, or too poor to bring it from surrounding springs to their doors. Manchester has set a good example, and it is only necessary that the national intelligence should be generally awakened to the question, for this great end—a good water supply—to be accomplished both in town and country.

Water Companies.	Sources of Supply.	Aggregate of Districts supplied chiefly by the respective Water Companies.			Deaths to 100,000 Inhabitants.
		Elevation in Feet above Trinity High-water Mark.	Population enumerated 1851.	Deaths from Cholera in 12 Weeks ending 12 Nov. 1853.	
LONDON - - - -	- - - - - - -	- -	2,362,236	626	27
Hampstead and New River -	Springs at Hampstead and Kenwood, two artesian wells, and New River.	80	166,956	6	4
New River - - - -	At Chadwell Springs in Hertfordshire, from River Lea, and four wells in Middlesex and Herts.	76	634,468	50	8
Grand Junction - - -	The Thames, 360 yards above Kew Bridge.	38	109,636	14	13
Chelsea - - - -	The Thames, at Battersea - - -	7	122,147	22	18
Kent - - - - -	The Ravensbourne, in Kent - -	18	134,200	27	20
West Middlesex - - -	The Thames, at Barnes - - -	72	277,700	72	26
East London - - - -	The River Lea, at Lea Bridge - -	26	434,694	124	29
Lambeth and Southwark -	The Thames, at Thames Ditton and at Battersea.	1	346,363	193	56
Southwark - - - -	The Thames, at Battersea - - -	8	118,267	100	85
Southwark and Kent - -	The Thames, at Battersea, the Ravensbourne in Kent, and ditches and wells.	- -	17,805	18	101

It is believed that through nearly the whole of this Table the impurity of the waters with which the inhabitants of the several districts are supplied is in nearly a direct proportion to the mortality from cholera.

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The water at St. Thomas's Hospital is thus described by Dr. R. Dundas Thomson, the professor of chemistry :—

The water as delivered at the pipe in the laboratory of St. Thomas's Hospital on the 11th November was quite turbid, as it usually is, and contained diffused through it 1·16 grains of vegetable matter, dried at a steam heat, consisting principally of silica, the chief constituent of the shields of the lower class of plants. But as in its moist state it contained at least two-thirds of its weight of water, we cannot estimate the filth in the water, which could be removed by filtration, at less than 3½ grains per gallon.

The influence of the water became more evident; and was discussed in the supplement to the Weekly Return (3rd December 1853), from which the following Table is taken :—

MORTALITY FROM CHOLERA IN DISTRICTS SUPPLIED BY DIFFERENT WATER COMPANIES.

Water Companies.	Sources of Supply.	Aggregate of Districts supplied chiefly by the respective Water Companies.			Deaths to 100,000 Inhabitants.
		Elevation in Feet above Trinity High-water Mark.	Population Enumerated 1851.	Deaths from Cholera in 14 Weeks ending 26 Nov. 1853.	
LONDON - - - - -	- - - - - - - -	39	2,362,236	744	32
* (1) Hampstead and (2) New River.	Springs at Hampstead and Kenwood, two artesian wells, and New River.	80	166,956	8	5
New River - - -	At Chadwell Springs in Hertfordshire, from River Lea, and four wells in Middlesex and Herts.	76	634,468	56	9
Grand Junction - - -	The Thames, 360 yards above Kew Bridge.	38	109,636	16	15
Chelsea - - - -	The Thames, at Battersea - - -	7	122,147	22	18
Kent - - - -	The Ravensbourne, in Kent - -	18	134,200	31	23
West Middlesex - -	The Thames, at Barnes - - -	72	277,700	89	32
East London - - -	The River Lea, at Lea Bridge - -	26	434,694	162	37
* (1) Lambeth and (2) Southwark.	The Thames, at Thames Ditton and at Battersea.	1	346,363	220	64
Southwark - - -	The Thames, at Battersea - -	8	118,267	121	102
* (1) Southwark and (2) Kent.	The Thames, at Battersea, the Ravensbourne in Kent, and ditches and wells.	- -	17,805	19	107

* In three cases (marked with an asterisk) the same districts are supplied by two companies.

After correcting the above Table and the Tables of cholera 1848–49, for the effects of elevation, it is found that a large residual mortality remains, which is fairly referable to to the impurity of the water; for it is least where the water is known to be sweetest; greatest where the water is known to be the most impure.

After the great loss of life in 1849, and the patient investigations of two able Committees of the House of Commons, the present Water Companies were left in the undisturbed possession of the monopoly which they enjoy of selling the people of London water. In the present state of engineering and sanitary science purer waters from gathering grounds, or from springs could probably be procured, and be supplied at cheaper rates by new companies, or by the incorporated ratepayers. But this would disturb the values of large masses of invested capital. To avoid such a result, always undesirable, the supply is left in the hands of the existing companies; but by Act of Parliament they are prohibited from obtaining supplies from the tidal waters of the Thames and Lea, after certain fixed dates.

It is enacted, that it shall not be lawful "after those dates" to distribute the pernicious waters over London. It unfortunately happens that in the invasion of cholera with which we are threatened next year (1854), every parish, except those which the Lambeth Company supplies, may receive waters as bad as those of 1849 without a direct violation of the Act of Parliament.

But the Water Companies will do well to bear in mind that the dates in the Act are the extreme limits of time beyond which they can supply London with impure water without a direct violation of the law. They may complete the works in half the time. They can accelerate their progress. And the returns which they have furnished will enable us to appreciate their zeal and spirit in the public service under an extraordinary emergency.

Instead of the distant dates of 31st August 1855, 1856, and 1857, which were fixed when the return of cholera was not not contemplated, the companies should aim at supplying London with the water which they are then bound to furnish, at a date not later than the 1st of July 1854. This would probably be the means of saving thousands of lives, and entitle the directors to the public gratitude.

Dates after which it will not be "lawful" for the Water Companies to supply waters from the same sources, or of the same quality, as at present (1853), to the inhabitants of London :

New River - - - - - - -	30th June 1857.
Grand Junction - - - - - -	31st August 1855.
Chelsea - - - - - - -	31st August 1856.
West Middlesex - - - - - -	31st August 1855.
East London - - - - - - -	August 1856.
Southwark - - - - - - -	31st August 1855.

The Grand Junction and the Southwark Companies state that they propose to complete their works in 1854, a year before the limit prescribed by the Legislature.

The

Appendix, No. 8.

The cholera broke out again in 1854: the effects of the bad water were watched during the epidemic; and the general results of a special inquiry are thus described in the Weekly Return (14th October 1854).

INFLUENCE of the WATERS of LONDON on the MORTALITY of CHOLERA.

The present epidemic of cholera in London presents a favourable opportunity for determining the influence of waters of various degrees of impurity on the mortality of cholera.

The Lambeth Company, which in 1849 took up its supply from the Thames at the part where the water is most impure, has since January 1852 drawn its water from the Thames above the tidal flow, and has thus afforded an opportunity for ascertaining the effects of this great improvement.

It was observed in the first eruption (1853) of the present epidemic, that the mortality was diminished in districts which were partially supplied by that company

On 13th October 1853, a circular had been sent to the London Water Companies, and the replies of all, except the Lambeth Company, showed that their new works and improvements had not then been carried out, as they were only bound under the Act of Parliament to complete them in 1855, 1856, or 1857.[*]

The Southwark Company, which now supplies the most impure water, stated, however, that though the Act "allowed three years from August 1852 for the execution of the new works, the contracts for the whole having been made immediately after the passing of the Act and *being now* [October] *in a rapid course of fulfilment, the works will be completed and in operation one year within the time it prescribes*," that is, in September 1854.

The hopes of the Company, notwithstanding their efforts on the approach of cholera, were defeated, the officers informed Lord Palmerston, by a concurrence of various causes, and the impure water of the Thames is still supplied by this Company

Bermondsey, one of the south districts of London, is exclusively supplied with the impure water, and the deaths by cholera are already more numerous than they were in 1849, while in the parish of Lambeth, which is supplied partly by the Southwark Company, and partly by the Lambeth Company, the mortality is much lower than it was in 1849.

DEATHS from CHOLERA.

Districts.	In the Year 1849.	In the 14 Weeks, ending 14 Oct. 1854.
Bermondsey - - - - - - -	734	829
Lambeth - - - - - - - -	1,618	904

But the pipes of the two companies, which were once in active competition, often run down the same streets, and through the same sub-districts, so that alternate streets or houses in the same sub-districts are supplied with the pure and the impure waters.

Dr. Snow, who has devoted much time to the investigation, having procured from this office the addresses of the persons who died of cholera in Kennington and some other sub-districts, states, as the result of an inquiry from house to house, where the pipes of the Lambeth Water Company are intimately mixed with those of the Southwark Company, that, in the seven weeks ending 26th August, of 600 deaths from cholera, 475 have happened in houses supplied by the Southwark Company; 89 in houses supplied by the Lambeth Company; 13 in houses supplied by pumps, wells, and springs; 8 in houses which derived their water directly from the Thames and from ditches.

The registrars on the south side of London were instructed to inquire, in all cases of death by cholera, whether the house in which the patient was attacked was supplied by the Southwark, the Lambeth, or the Kent Companies, or with water from pumps, wells, ditches, or other sources. The inquiry was attended with considerable difficulty, as the information could not be obtained from hospitals or workhouses, and the informants and the householders themselves were often ignorant of the source of supply, as the water rate in the worst districts is paid by the landlord. The information was thus not obtained in 766 out of 3,805 instances; but it was stated that in 3,039 instances 2,284 deaths occurred in houses supplied with the impure Thames water, 294 in the houses supplied by the Lambeth Company with the purer filtered Thames water. The disparity was observed week after week in the progress of the epidemic.

The total number of houses supplied by the Southwark Company is stated to be 40,046; by the Lambeth Company to be 26,107; consequently there were in 6 weeks 57 deaths in every 1,000 houses supplied with impure water, and 11 in every 1,000 supplied with the less impure or comparatively pure water.

MORTALITY by CHOLERA in the SOUTH DISTRICTS of LONDON during the Six Weeks—28 August to 7 October, 1854.

———	Inhabited Houses.	Population enumerated 1851.	Deaths from Cholera.	Mortality to every 100,000 Inhabitants.	Mortality to every 1,000 Houses.
South Districts of London - - - -	92,654	616,635	3,805	617	41

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[*] The Secretary of the East London Water Company in August 1854, wrote thus to Viscount Palmerston:—"In reply to your Lordship's inquiry, what steps have been taken by the East London Waterworks Company to effect a remedy in regard to the water supplied by them, I am instructed to state that the Company has already expended 150,000 *l.* in effecting improvements; the supply has, for two months past, been taken through a newly-constructed aqueduct, from a point in the valley of the Lea, nearly three miles higher up than formerly; the sewage of the valley, so far as it can effect the purity of this company's supply, has been diverted by an intercepting drain, and the whole of the water delivered is filtered. Further works are also in progress.

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DEATHS by CHOLERA in SIX WEEKS in the Houses of the SOUTH DISTRICTS of LONDON supplied with Water from various Sources.

Week ending	Number of Houses supplied with Water by					
	The Southwark Company.	The Kent Company.	The Lambeth Company.	Pumps, Wells, and other Sources.	Unascertained Sources.	Total.
September 2 - - - -	399	38	45	72	116	670
September 9 - - - -	580	45	72	62	213	972
September 16 - - -	524	48	66	44	174	856
September 23 - - -	432	28	72	62	130	724
September 30 - - -	228	19	25	24	87	383
October 7 - - - -	121	10	14	9	46	200
	2,284	188	294	273	766	3,805

INFLUENCE of the WATER SUPPLY on the MORTALITY from CHOLERA in the SOUTH DISTRICTS of LONDON during the Six Weeks from 28 August to 7 October 1854.

Water Company.	Source of Supply.	Houses supplied.	Estimated Population of the Houses supplied.	Deaths registered by Cholera in Houses.	Mortality to every 100,000 Inhabitants.	Mortality to every 1,000 Houses.
Southwark Company -	The Thames, at Battersea - -	40,046*	266,516	2,284	857	57
Lambeth Company -	The Thames, at Thames Ditton -	26,107	173,748	294	169	11
Kent Company - -	The Ravensbourne - - - -	14,594	97,127	188	194	13

* There are, *exclusive* of this number, 634 consumers, viz., railways, distilleries, road watering, fires, flushing sewers, and trades generally, averaging per day 2366 gallons. (*See* Parliamentary Return , "Metropolis Water," dated 26th July 1854, No. 415.)

Note.—The sources of water supply were not ascertained in 766 instances . The water was said to be derived from pumps, wells, rivers, and other sources in 273 instances.

At the close of the epidemic, the result of the observations on the water were finally summed up in the weekly return, 9th December 1854 :—

The deaths of 26,088 people in London, out of two millions and a half, living in 135 sub-districts, at elevations rising from three feet below to 350 feet above the high-water mark of the Thames, have shown how much more fatal the cholera is on low ground than it is on ground of a moderate elevation.

It has been calculated that more than 4,000,000 gallons of water evaporate daily from the Thames in its course through London ; and besides the supply from wells, pumps, and streams, nine water companies in their returns state that they pumped on an average 60,614,420 gallons of water into 302,428 houses and a certain number of manufactories daily, during the year 1853. The water that flows through the houses and streets daily is probably double the weight of the population. It is pumped at intervals into reservoirs until it is withdrawn for cooking, for cleansing, for washing linen, for ablution, and in some cases for drink by the people. It thus comes into contact with the body in many ways, and it gives off incessantly, at its temperature, ranging from the freezing point to summer heat, vapours and effluvia into the atmosphere that is breathed in every room ; while the residue is discharged to carry the dirt of the houses and the town guano of the waterclosets into the sewers and the Thames.

A certain portion of the water of London is drawn by the New River Company from distant springs and wells in the basin of the Lea river, which is a tributary of the Thames ; but a large quantity of the water of this Company, as well as the whole of the water of the East London Company, is drawn from the Lea lower down its channel. The Lambeth Company draws its water from the Thames at Ditton, above the tidal range ; but the Grand Junction at Kew, the West Middlesex at Hammersmith, and still lower down at Battersea, the Chelsea and Southwark Companies draw up their water from a part where the Thames is now evidently contaminated by the sewers which discharge the drainage of the population into the river. The temperature of the water of the Thames ranged from 60 to 70 degrees during the cholera epidemics, and the chemical composition and changes of the matters in its waters undoubtedly varied to a great extent ; but the microscope and chemical analysis have confirmed the evidence of the senses, in showing that the water which the Chelsea and the Southwark Companies draw at Battersea contains the greatest quantity of organic matter ; that it is the most impure ; and that fragments of the muscular fibre of food exist in the Southwark water. The other waters are of a better quality.

The mortality from cholera in the sub-districts of London is shown under two aspects ; thus, the mean mortality of the districts wholly or partially supplied by the New River Company in the two epidemics was at the rate of 15, 28, 28, 46, and 70 in every 10,000 living on the successive terraces of elevation ; and the mortality in the sub-districts that are supplied by other companies at corresponding elevations is found to differ from this scale, some in excess, others in defect.

In the supply by all the companies extensive improvements are projected, and in some cases have been partially carried out. The New River Company states in reply to an inquiry, that "works have been since June in operation to prevent sewage from Waltham, Ponder's-end, and Tottenham, running into the

River Lea, which before affected the pumping station at Tottenham." On the terrace of 60 to 80 feet elevation, containing Berwick-street, the cholera was more fatal (30) in 1854 than it was in 1849, when it was 25; but on the other elevations the mortality from cholera was less than it was before, in the proportion of 18, 42, 72, and 73, in 1849; and 11, 14, 19, and 67, in 1854, to every 10,000 inhabitants, at the respective elevations, supplied with water by the New River. A similar decrease is observed in the mortality of the sub-districts supplied by the East London Company, which has latterly drawn its water three miles higher up the River Lea than it did in 1849.

The sub-districts that were supplied by the Grand Junction and by the West Middlesex Companies suffered much less from cholera in 1849 than the sub-districts of the New River and the East London; but in 1854 the mortality increased in the districts of the two former companies, and in all the districts that derive their water from the Thames, which from Kew down to Battersea and Chelsea has every year for the last five years received an increased quantity of town sewage.

The Lambeth Company has in the interval between the two epidemics changed the source of its supply from Hungerford Bridge to Thames Ditton, where the river is unpolluted by the London sewage; but the pipes of this company run into the same districts as those of the Southwark Company, against which it was at one time in active competition, so that a special method of inquiry must be here resorted to. The Tables 1 and 2, only show that the sub-districts that were supplied wholly or partially with the impurest Thames water experienced a high and extraordinary mortality from cholera in 1849, and again in 1854.

The region of London south of the Thames is divided into 11 large districts, comprising 42 sub-districts, which extend from Putney in the west to Woolwich in the east, from the large tract of low ground along the Thames to the heights of Norwood and Sydenham. Many houses in every district derive their water supply from wells, pumps, and tidal ditches; in addition to these sources, Bermondsey, St. Olave, and Wandsworth, are supplied almost exclusively by the Southwark Company; the Greenwich and the Lewisham districts chiefly by the Kent Company; in the streets of the other districts the pipes of the Lambeth and Southwark Company, the one supplying water comparatively pure, the other impure, are so intermingled that neither the informants nor the registrars knew in 823 cases out of 4,059, whether the house in which the death from cholera occurred obtained its water from the Lambeth, Southwark, or the Kent Company. The officers of the latter Company themselves have stated that they experience almost insuperable difficulties in distinguishing the houses which they supply in every street. It is therefore evident, that in the general character of the houses, the means of the householders, the density of the population, and the elevation of their dwellings, the difference is not considerable. The water supply is the chief element in which there is an evident difference; one class of houses is now supplied by water from Ditton, the other by water which the Southwark Company draws from Battersea, where the Thames is contaminated by the London sewage. And what is the result?

In the 26,107 houses that derived the water from Ditton, 313 deaths from cholera occurred in 10 weeks; in the 40,046 houses that received the impure water from Battersea, 2,443 persons it was ascertained died from cholera in the same time. The deaths in the latter districts exceeded by nearly 2,000 the deaths that would have occurred if cholera had only been as fatal as it was in the houses that derived their water from Ditton. The registrars were probably in some cases misinformed, but there is reason to believe that no undue proportion of the deaths is referred to houses that the Southwark Company supplies.

The deaths are given in Table 3, as they were returned by the registrars in the 11 districts; and it will be observed that the balance of mortality is heaviest in every district against the impure water, to an extent that leaves little room for doubt on the mind.

Thus, in *St. Saviour*, Southwark, 280 of the deaths by cholera were in houses supplied by the Battersea water, 59 in houses supplied with the Ditton water. In the week ending 2nd September, the proportions were 58 to 11; in the week ending 14th October, they were nine to one. In *St. Olave*, containing the hospitals, and in Bermondsey, an undue proportion is perhaps referred to Southwark, as the registrars notice no cases in houses that derived water from wells and ditches. In *St. George*, Southwark, 254 persons died of cholera in houses that were supplied with water from Battersea; 79 in houses that were supplied with water from Ditton; the proportions were 303 to 47 in Newington, 349 to 95 in Lambeth, 206 to 6 in Wandsworth and Clapham, 167 to 24 in Camberwell; and so the proportions ran week after week. And it will be observed that in Bermondsey, which is not entered by the Lambeth Company, 734 persons died by cholera in 1849, and 846 in 17 weeks of 1854; while in Lambeth, which was wholly supplied with impure water in 1849, the deaths in that year by cholera were 1,618, while in 17 weeks of 1854, when it was partially supplied with a comparatively purer water, the deaths by cholera were only 935; of which about four-fifths were in houses that received impure water.

Works are now in progress for procuring better water for Southwark and for the rest of London; and the salutary effects of the changes that have been already wrought justify us in anticipating that when London is well drained, and when the water companies supply London with the cool, pure, refreshing water of the streams from the high grounds of Middlesex, Hertford, and Surrey on the system of constant supply, the health of the Meteopolis will be improved; and under wise medical arrangements the devastations of cholera, if they recur, will be no longer terrible.

Appendix, No. 8.

TABLE of Deaths from Cholera in the Eleven Districts of London on the South Side of the Thames, distinguishing the Deaths in Houses supplied with Water by Three Water Companies, or by Wells, Pumps, &c.

DISTRICTS.	Signatures of Companies by which the Water is chiefly supplied.	DEATHS from CHOLERA.		Of the Deaths from Cholera in 17 Weeks of 1854, it was found, by Inquiry in 10 Weeks, that the subjoined Numbers occurred in Houses of which the Water Supply was inquired into.					
					Deaths in Houses supplied with Water by—				
		1849 (Year).	1854 (17 Weeks).	TOTAL Deaths investigated in 1854.	Southwark Company.	Lambeth Company.	Kent Company.	Wells, Pumps, Rivers, and other Sources.	Source of Supply unascertained.
St. Saviour, Southwark -	S. L.	539	491	341	280	59	-	-	2
St. Olave, Southwark -	S.	349	313	209	186	-	-	?	23
Bermondsey - - -	S.	734	846	555	555	-	-	?	—
St. George, Southwark -	S. L.	836	543	386	254	79	-	-	53
Newington - - -	S. L.	907	694	525	303	47	-	1	174
Lambeth - - - -	L. S.	1,618	935	684	349	95	-	9	231
Wandsworth - - -	S.	484	421	325	206	6	-	73	40
Camberwell - - -	S. L.	504	549	352	167	24	11	102	48
Rotherhithe - - -	S.	352	283	180	139	-	9	2	30
Greenwich - - -	K.	718	563	441	4	-	161	85	191
Lewisham - - -	K.	96	81	61	-	3	15	12	31
TOTAL - - -	-	7,137	5,719	4,059	2,443	313	196	284	823

The Southwark Water Company, which obtains its supply from the Thames at Battersea, near the Red House, supplied 40,046 houses in 1853.

The Lambeth Water Company obtains its supply from the Thames at Thames Ditton, about a mile and a half above Kingston, and three miles beyond the influence of the tide. This company supplied 26,107 houses in 1853.

The Kent Water Company obtains its supply from the Ravensbourne, below the Lewisham Mills. It supplied 14,594 houses in 1853.

The further inquiry to which reference has been made in the weekly returns was undertaken at the instance of the Board of Health committee for scientific inquiries*; and the general result, as stated in the lucid report of Mr. Simon, the medical officer of the Board of Health, is—" the population drinking dirty water accordingly appears to have suffered three and a half times as much mortality as the population drinking other water."

The results of this conclusive investigation of the Board of Health completes the inquiry.†

SYNOPSIS of RESULTS.

Death Rates per 1,000 of living Population in two Epidemic Periods.		In Houses enumerated in 1854 as receiving their Water Supply	
		From the Lambeth Company.	From the Southwark and Vauxhall Company.
Cholera - - -	1848–9 -	12·5	11·8
	1853–4 -	3·7	13·0
Diarrhœa - - -	1848–9 -	2·9	2·7
	1853–4 -	2·1	3·3

N.B.—Between the two epidemic periods the Lambeth Water Company had changed its source of supply.

We

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* The committee consisted of Arnott, Baly, Farr, Owen, and Simon. The analysis of the facts was conducted at the General Register Office, where all the calculations of the Report of the Board of Health Inquiry were made.

† Report on the last two cholera epidemics as affected by the consumption of impure water. By the medical officer of the Board, page 6.

Appendix, No. 8.

We have now learnt in England that the mortality of a settled population, or of such moving bodies of men as armies, in an epidemic of cholera, is reduced to an insignificant fraction, when they are lodged on places of some elevation, are supplied with pure water, are kept in generally favourable hygienic conditions, and obtain, when attacked by diarrhœa, immediate medical advice.

The practical importance of these results is evident, when we reflect that the disease which they show us how to combat destroyed within seven years, in two epidemics, little less than *a quarter of* a *million* of the population of the United Kingdom at home, where its visitations were less deadly than they were in our army and navy abroad and among other nations.

It is right to state that Dr. Snow by his hypothesis,* by his researches, and by his personal inquiries, that the Registrar General, by procuring information and by promoting inquiry, as well as the Board of Health by their Report, have all contributed in various ways to establish the fact that the cholera matter or *cholerine* where it is most fatal is largely diffused through *water* as well as through other channels.

Appendix to Registrar General's Seventeenth Annual Report, pp. 90–99.

CHOLERA IN LONDON, 1866.

EXTRACTS from the REGISTRAR GENERAL'S WEEKLY RETURNS during the Course of the Epidemic.

Week ending Saturday, 2 June.

The deaths registered in London during the week were 1,540. It was the 22nd week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,195. The mortality is still very high. It is in excess of the estimated amount by 345.

The following two deaths from cholera were registered:—

On 28th May, at 58, North-street, Walworth, the son of a labourer, aged 10 months, died of "Asiatic cholera (one day)."

On 31st May, at 3, Charles-street, Bethnal-green, the son of a warehouseman, aged five years, died of "choleraic diarrhœa (24 hours); convulsions (6 hours)."

A blacksmith, aged 47 years, died of "melanosis of the lung (6 months)."

Week ending Saturday, 9 June.

The deaths registered in London during the week were 1,383. It was the 23rd week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,196. The actual number exceeds the estimated amount by 187.

The following three deaths from cholera were registered in the week:—

At 18, North-street, Marylebone, on the 1st June, the widow of a journeyman carpenter, aged 49 years, died of "choleraic diarrhœa (48 hours)."

At 1, Duke's-lane, Kensington, on 2nd June, a needlewoman, aged 33 years, "English cholera."

At 47, South-street, May-fair, on 6th June, the daughter of a physician, aged 6 months, "choleraic diarrhœa (4 days)."

A labourer died in St. George's Hospital of "elephantiasis, amputation, exhaustion."

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* The following is a very brief outline of Dr. Snow's views as expressed in his last publication, *Cholera and the Water Supply in the South Districts of London*:—

"The cholera commences as an affection of the alimentary canal, and not with general illness; there is no evidence of poisoning of the blood in this disease, except in some cases where secondary fever occurs; there is conclusive evidence that cholera may be communicated from person to person, and it follows, therefore, that the morbid matter which produces the disease is applied to the interior of the alimentary canal, where it increases and multiplies during the period of so-called incubation, and passes off, during the attack, to cause fresh cases when suitable opportunities occur. Various circumstances connected with the propagation of cholera seem in accordance with the above view of its pathology. Thus, it was observed to pass frequently from person to person in the crowded habitations of the poor, who eat, drink, cook, and sleep in the same apartment, and pay little or no regard to cleanliness, who live, in fact, under circumstances where the sudden and copious evacuations of cholera, soiling the bed and body linen, would not fail to contaminate the hands of the patient and his attendants, and be thence transferred to any food they might touch. The absence of colour and odour in the evacuations could not help to favour this result.

"It occurred to me, as soon as I began to entertain the above opinions, that if the cholera excreta could reproduce the disease in the way just mentioned, they might also do so when diffused in water taken as drink, and that unless this were the case the whole of the phenomena of cholera as an epidemic could not be explained."

Week ending Saturday, 16 *June.*

The deaths registered in London during the week were 1,370. It was the 24th week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,218. The actual return exceeds the estimated number by 152.

The following three deaths from cholera were registered:—

On 12th June, at 3, Archibald-street, Bromley, the daughter of a mariner, aged 8 months, "choleraic diarrhœa."

On 12th June, at 16, Dowson's-place, Mile-end New Town, the daughter of a rag-sorter, aged 11 months, "choleraic diarrhœa (7 days)."

On 13th June, at 6, Swan-court, Newington, a watchman, aged 55 years, "cholera (3 days)."

Week ending Saturday, 23 *June.*

The deaths registered in London during the week were 1,295. It was the 25th week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,208.

Diarrhœa is increasing with the summer heat, and 43 fatal cases of it are returned. A death from cholera was registered as follows:—

On 21st June, at 4, Nursery-place, Walworth, the daughter of a herbalist, aged 7 weeks, "cholera (4 days)."

Week ending Saturday, 30 *June.*

The deaths registered in London during the week were 1,400. It was the 26th week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,263. The actual return is therefore higher than the estimated number by 137.

The following six deaths from cholera were registered in the week:—

On 27th June, at 12, Priory-street, Bromley, a labourer and his wife, both of the age of 46 years, died of "cholera Asiatica," the former after 15 hours', the latter after 12 hours' illness.

On 25th June, at 20, New-street, Berwick-street sub-district (St. James, Westminster), two girls, the daughters of a tailor's porter, aged respectively 2 years and 6 years, "English cholera (18 hours)."

On 21st June, at 21, Old Bethnal-green-road, a boy, aged 11 months, "choleraic diarrhœa; exhaustion."

On 22nd June, at 51, Wellington-place, Holloway, a girl, aged 14 years, "English cholera (38 hours); syncope."

Week ending Saturday, 7 *July.*

The deaths registered in London during the week were 1,292. It was the 27th week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,269.

There were 102 deaths from diarrhœa, 92 of which occurred under two years of age. The corrected average number of deaths from this complaint in the 27th or corresponding week of 10 previous years is 105. In the corresponding week of 1863 it was 47; in that of 1864 it was 81; in that of 1865 it was 301. Although there is much diarrhœa, it can hardly be considered excessive for the beginning of July.

The following deaths from cholera were registered in the week:—

On 29th June, at 3, George-street, Hammersmith, a labourer, aged 50 years, "cholera."

On 30th June, at 58, Myddelton-square, Clerkenwell, a boy, aged 7 years, "English cholera (24 hours)."

On 5th July, at 96, Borough-road, a boy, aged 6 weeks, "cholera (38 hours)."

Besides these, 11 deaths of children, chiefly infants, are returned as caused by "choleraic diarrhœa."

Week ending Saturday, 14 *July.*

The deaths registered in London during the week were 1,540. It was the 28th week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,293. The actual return exceeds the estimated number by 247.

The intense heat of the weather has favoured the development of diarrhœal disorders. Diarrhœa was fatal in 150 cases; and 32 deaths by cholera are recorded in the week, of which two were in the west, four in the north, three in the central, 20 in the east, and three in the south districts. About half of the number are cases of death by choleraic diarrhœa, or summer cholera. The 17 following are of a severer character:—

London City; North-west.—At 27, London-wall, on 12th July, the wife of a blacksmith, aged 40 years, "cholera (24 hours)."

Shoreditch; Hoxton New Town.—At St. Luke's Workhouse, on 9th July, a japanner, aged 62 years, "cholera (2 days)."

Bethnal Green; Green.—At 29, Wellington-place, on 12th July, a porter, aged 37 years, "cholera (12 hours)."

In same sub-district, at the workhouse, on 13th July, a bricklayer, aged 42 years, "Asiatic cholera (30 hours)."

Whitechapel; Church.—At the London Hospital from Whitechapel, on 11th July, a female, aged 25 years, "cholera."

St. George-in-the-East; St. Paul.—At 14, Lower Chapman-street, on 13th July, a railway porter, aged 30 years. "Asiatic cholera (9 hours)."

Stepney; Ratcliff.—At 10, The Orchard, on 14th July, a ballast-getter, aged 22 years, "cholera (14 hours)."

Stepney; Limehouse—At 72, Lower North-street, on 11th and 13th July, the son and wife of a dock labourer, aged respectively 9 and 46 years, "cholera Asiatica (9 hours), exhaustion;" "cholera Asiatic (14 hours)."

In same sub-district, at 73, Lower North-street, on 13th July, the daughter of a painter, aged 6 years, "cholera Asiatica (13 hours)."

Mile-end Old Town; Eastern.—At 1, Washington-street, on 14th July, a rope maker, aged 37 years, "cholera Asiatica (22 hours)."

Poplar; Bow.—At 1, Crown-terrace, Bromley, on 21st July, a domestic servant (female), aged 50 years, "cholera Asiatica (12 hours)."

In same sub-district, at 5, Catherine-street, Bromley, on 12th July, the wife of a shipwright, aged 41 years, "Asiatic cholera (16 hours)."

In same sub-district, at 8, Wellington-street, Bromley, on 12th July, an excavator, aged 56 years, "Asiatic cholera (14 hours.)"

In same sub-district, at 1, Halsey-court, Bow, on 13th July, a mariner, aged 63 years, "choleraic diarrhœa (30 hours)."

Bermondsey; St. James.—At 23, Keeton's-road, on 9th July, a mate in the merchant service, aged 29 years, "Asiatic cholera (11 hours)." The medical attendant states that the man arrived with a cargo of fruit on the 7th instant from Rotterdam, where cholera has prevailed.

Camberwell; Camberwell.—At 60, Waterloo-street, on 13th July, a carrier, aged 47 years, "cholera (18 hours)."

Immediate measures should be adopted by house-to-house visitation and otherwise to treat the disease in its earliest stages of diarrhœa, and the cholera excretions should be effectually removed or destroyed.

Week ending Saturday, 21 *July*.

The deaths registered in London during the week were 1,798. It was the 29th week of the year; and the average number of deaths for that week was, with a correction for increase of population, 1,370. The deaths in the present return exceed by 428 the estimated number.

While epidemic cholera has been for months prevalent in several cities on the Continent, and in some cities, such as Amiens, as Dr. Druitt shows, has been extraordinarily fatal, London has hitherto remained free from its ravages. At the end of June the temperature was excessively high, and after that date cholera cases were noticed; their character was not at first grave; but in the first week of July, 14 cases; in the second, 32 cases of cholera, were registered, half of them at least of the epidemic type. In the week that ended on Saturday last, 346 deaths from cholera were recorded. This fatal explosion occurred chiefly in the comparatively poor districts of the East of London. The mortality by the epidemic is much greater than it was in the corresponding week of 1854, but not so great as it was in the epidemic of 1849.

Of the 346 fatal cases now recorded, 308 occurred in the East districts of the metropolis. In the sub-district of Bow, the total number of deaths was 77; of these, 39 were referred to cholera. In the sub-district of Poplar, 93 deaths were registered, and the deaths from cholera were 52. In the sub-district of Limehouse, the deaths were 54; of these, 43 were from cholera. In the Green sub-district, Bethnal-green, 59 deaths occurred; 30 of these from cholera. In the sub-district of Mile-end Old Town, Eastern, 57 deaths were recorded, 33 from cholera. Eleven deaths from cholera were registered in the West districts, six in the North, and 20 in the South. Only one death from the epidemic occurred in the Central districts. Former experience should now be turned to account; and the authorities should be as prompt in defence as the cholera is in attack.

Week ending Saturday, 28 *July*.

The deaths registered in London during the week were 2,600. It was the 30th week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,387. The deaths in the present return exceed by 1,213 the estimated number.

The excess of deaths is caused entirely by cholera and diarrhœa: 904 deaths by cholera, 349 by diarrhœa, were registered in the week, making in the aggregate 1,253 deaths. The deaths by cholera in the last five weeks have been 6, 14, 32, 346, and 904; by its allied disease, diarrhœa, 67, 102, 150, 221, and 249. The epidemic takes the form of diarrhœa chiefly in young children; thus 309 of the 349 deaths from diarrhœa last week were children under five years of age, including 244 infants. Of cholera, 179 children of the same age died; 160 boys and girls of five and under 20 years of age; 455 men and women in the prime of life; and 110 people of ages above 60.

It is a peculiarity of the case that the greater part of this slaughter in seven days of 1,253 people of all ages took place within a limited portion of the London area: 924 of the deaths, 811 by cholera, and 113 by diarrhœa, were registered in the six districts of Bethnal-green, Whitechapel, St. George-in-the-East, Stepney, Mile-end Old Town, and Poplar, including Bow, among about a seventh part of the population of London and on one-fourteenth of its area. The attack extends all along the north side of the Thames, from the River Lea and the Isle of Dogs to the Tower of London. Limehouse Basin and the Regent's Canal are the central line of the attack, which stretches as far north as Victoria-park. This is essentially the port of London, inhabited by its maritime population. The canals and the basin are full of foul water, and are apparently connected with the Limehouse cut, the Hackney cut, and the River Lea. The East London Waterworks canal

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canal draws its supply from the river at Lea Bridge, where there is a reservoir, and runs for a couple of miles by the side of the Hackney cut, down to its other reservoirs north of of Bow and near the Lea. The present cholera field derives its waters from these works. It is right to add, that the water has hitherto borne a comparison with the other London waters in Dr. Frankland's analyses. To-day, at Poplar, the water looks clear, and no complaints are made of its quality. The Company will, no doubt, take exemplary pains to filter its waters; but it is not easy to guarantee the purity of water drawn from such a river as the Lea, in dangerous proximity to sewers, cuts, and canals.

Whoever will take the trouble to go among the people now suffering in crowded dwellings will see the danger of the water butt; poor women are washing the dirty linen of patients with water drawn from those vessels, which are often found close to the water-closets. It would be a source of additional safety to London if the tanks and butts were all abolished, and the pipes were filled on the system of constant supply. The time has come for this reform.

The mortality is overwhelming in some of the districts. In Poplar alone 145, in Bow 188 people died last week, including Dr. Ansell, the meritorious health officer, and Mr. Ceeley, clerk to the Board of Works, whose name figures on the placards. The people are falling ill every hour; you see them of all ages, children and adults, lying about their beds like people under the influence of a deadly poison, some acutely suffering, nearly all conscious of their fate, and of all that is going on around them. Here the doctor is drawn in by the husband to see the wife now attacked; there the husband lies in spasms; here is an old woman seated dead, with eyes wide open; there lies a fine four-year old child, his curly head drooping in death, but his mother says the pulse is strong, and he takes what she gives him. An older brother just recovered is running about. Several wards of the London hospital are full of patients, many of them very young children in all stages of the disease; some dying, some well again and playing. The medical men have no rest, and with the Health Officers are nobly doing their duty; brave men ready to lay down their lives for their patients. The people themselves are most patient; most willing to help each other, the women always in front, and none shrinking danger. There is no desertion of children, husbands, wives, fathers, or mothers, from fear.

In the midst of this scene, the authorities have been to some extent paralyzed. The nuisance inspectors are not sufficiently numerous, neither are the medical officers. The administrative work has not been organised with sufficient promptitude, and is not carried out with sufficient energy.

Such a calamity as this may well call forth the whole resources of London, and what is especially wanted is executive power well organised in conjunction with the Medical Health Officers. The people of East London want help.

Population and Water Supply of Sub-Districts, also Deaths from Cholera, in each of the Three Weeks ending 28th July 1866.

Water Company furnishing chief Supply.	REGISTRARS' SUB-DISTRICT.	Population, 1861.	Deaths from Cholera in the Week ending Saturday,		
			14 July 1866.	21 July 1866.	28 July 1866.
	WEST DISTRICTS.				
Grand Junction and West Middlesex.	St. Mary, Paddington, W H	39,015	–	1	1
Grand Junction -	St. John, Paddington H	36,769	–	–	1
West Middlesex -	Kensington Town - W	51,910	–	1	1
West Middlesex and Chelsea.	Brompton - - H	18,198	–	–	1
West Middlesex and Grand Junction.	St. Peter, Hammersmith	5,415	–	2	2
Ditto - - -	St. Paul, Hammersmith -	19,104	–	5	–
West Middlesex and Wells.	Fulham - - W	15,539	–	2	1
Chelsea - - -	Chelsea, South - H	21,654	–	–	1
Ditto - - -	Chelsea, North-west H W *w*	19,899	–	–	–
Ditto - - -	Chelsea, North-east -	21,886	–	–	–
Grand Junction -	Hanover-square - -	19,773	–	–	–
Ditto - - -	May Fair - - W	12,885	–	–	–
Chelsea - - -	Belgrave - - H	55,113	1	–	2
Ditto - - -	St. John, Westminster -	37,483	1	–	1
Ditto - - -	St. Margaret, Westminster W H	30,730	–	–	–

Water Company furnishing chief Supply.	REGISTRARS' SUB-DISTRICT.	Population, 1861.	Deaths fro Cholera in the We ending Saturday	
			14 July 1866.	21 July 1866.
	WEST DISTRICTS—*contd*.			
New River and Chelsea	Charing Cross - W H	11,071	–	–
New River - -	Long Acre - - -	11,618	–	–
Ditto - - -	Berwick-street - -	10,607	–	–
Grand Junction -	St. James's-square -	10,753	–	–
Ditto - - -	Golden-square - W	13,966	–	–
	NORTH DISTRICTS.			
West Middlesex -	All Souls', Marylebone H	29,952	–	–
Ditto - - -	Cavendish-square - -	15,090	–	1
Grand Junction and West Middlesex.	Rectory, Marylebone -	26,692	–	1
Ditto - - -	St. Mary, Marylebone -	22,493	–	–
West Middlesex -	Christ Church, Marylebone	34,913	–	–
Ditto - - -	St. John, Marylebone -	32,540	–	–
New River and West Middlesex.	Hampstead - - W	19,106	–	–
West Middlesex and Hampstead.	Regent's Park, Pancras -	34,927	1	–

Note.—The letters placed against the names of the sub-districts denote public institutions situated therein, namely—

W—Workhouse.	L—Lunatic Asylum.
H—Hospital.	*w*—A workhouse not belonging to the district in which it is situated.

ter Company furnishing hief Supply.	REGISTRARS' SUB-DISTRICT.	Population, 1861.	Deaths from Cholera in the Week ending Saturday,		
			14 July 1866.	21 July 1866.	28 July 1866.
	NORTH DISTRICTS—*contd*.				
iver and West llesex.	Tottenham-court - *w* H	29,371	–	–	–
iver - -	Gray's-inn-lane - H	27,808	–	–	1
o - - -	Somers Town - -	39,099	1	–	2
iver and Hamp- d.	Camden Town - W	23,266	–	–	4
tead - -	Kentish Town - -	44,317	–	–	3
iver - -	Islington, West W H H	75,442	1	–	1
o - - -	Islington, East - W *w*	79,899	1	–	1
o - - -	Stoke Newington - -	6,608	–	–	–
ondon - -	Stamford-hill - - -	5,483	–	–	1
iver - -	West Hackney - -	24,265	–	–	1
ondon and New r.	Hackney - W H *w*	31,481	–	3	–
ondon - -	South Hackney - L	15,458	–	1	3
	CENTRAL DISTRICTS.				
iver - -	St. George, Bloomsbury -	17,392	–	–	1
o - - -	St. Giles, South - W	19,483	–	–	–
o - - -	St. Giles, North - -	17,201	–	–	–
o - - -	St. Anne, Soho - -	17,426	–	–	–
o - - -	St. Mary-le-Strand -	10,346	–	–	1
o - - -	St. Clement Danes H	15,207	–	–	1
o - - -	St. George-the Martyr H	19,903	–	–	–
o - - -	St. Andrew, East Holborn W	12,947	–	–	–
o - - -	Saffron-hill - - -	12,012	–	–	–
o - - -	St. James, Clerkenwell W	19,152	1	–	–
o - - -	Amwell, Clerkenwell -	17,250	–	–	1
o - - -	Pentonville - - -	13,079	–	–	–
o - - -	Goswell-street - -	16,200	1	–	1
o - - -	Old-street - - -	11,504	–	–	–
o - - -	City-road - - H L	17,860	–	–	1
o - - -	Whitecross-street - -	14,778	–	–	–
o - - -	Finsbury - - -	12,931	–	–	1
iver and East don.	St. Botolph, East London	20,990	–	–	4
iver - -	Cripplegate - - -	19,697	–	–	1
o - - -	West London, North W H	11,750	–	1	1
o - - -	West London, South -	15,395	–	–	1
o - - -	London, City, South-west	7,762	–	–	–
o - - -	London, City, North-west	9,020	1	–	–
o - - -	London City, South -	8,570	–	–	–
o - - -	London City, South-east	8,659	–	–	–
o - - -	London City, North-east -	11,544	–	–	1
	EAST DISTRICTS.				
iver and East don.	Holywell, Shoreditch -	17,313	–	1	1
iver - -	St. Leonard's, Shoreditch L	19.188	–	–	1
o - - -	Hoxton New Town - *w*	26,516	1	3	5
o - - -	Hoxton Old Town - -	25,777	–	–	–
o - - -	Haggerstone, West W	23,260	1	1	–
ondon - -	Haggerstone, East - -	17,310	–	–	–
o - - -	Hackney-road - -	26,298	–	3	8
o - - -	Green, Bethnal Green W H L	31,789	2	30	49
o - - -	Church, Bethnal Green	25,528	1	8	18
o - - -	Town, Bethnal Green -	21,486	1	2	15
o - - -	Artillery, Whitechapel -	6,557	–	2	1
o - - -	Spitalfields - - -	15,700	–	–	9
o - - -	Mile End New Town W	15,392	–	7	25
o - - -	Whitechapel, North -	12,122	1	2	9
o - - -	Whitechapel Church H	8,062	1	8	70
o - - -	Goodman's Fields - -	11,166	–	5	12
iver and East don.	Aldgate - - - -	9,971	–	1	5
ondon - -	St. Mary, St. George's-in-the-East	18,181	–	10	26

Water Company furnishing chief Supply.	REGISTRARS' SUB-DISTRICT.	Population, 1861.	Deaths from Cholera in the Week ending Saturday,		
			14 July 1866.	21 July 1866.	28 July 1866.
	EAST DISTRICTS—*contd*.				
East London - -	St. Paul, St. George's-in-the-East.	21,015	1	8	23
Ditto - - -	St. John, St. George's-in-the-East. W	9,695	–	7	30
Ditto - - -	Shadwell - - W	12,537	–	10	22
Ditto - - -	Ratcliff - - - W	16,874	2	14	38
Ditto - - -	Limehouse - - W	27,161	4	43	75
Ditto - - -	Mile End Old Town, West	33,747	–	19	47
Ditto - - -	Mile End Old Town, East W *w*	39,317	1	33	75
Ditto - - -	Bow - - *w w* L	35,667	4	39	141
Ditto - - -	Poplar - - - W	43,529	–	52	113
	SOUTH DISTRICTS.				
Lambeth and Southwark.	Christ Church, Southwark W	17,069	–	–	1
Southwark - -	St. Saviour, Southwark H	19,101	–	–	–
Ditto - - -	St. Olave, Southwark H	7,663	–	2	1
Ditto - - -	St. John, Horsleydown W	11,393	–	–	–
Ditto - - -	St. James, Bermondsey -	25,154	1	1	2
Ditto - - -	St. Mary Magdalen - W	16,505	–	–	–
Sowthwark and Lambeth.	Leather Market - -	16,696	–	–	–
Ditto - - -	Kent-road - - -	19,652	–	1	–
Ditto - - -	Borough-road - - W	16,668	–	–	1
Lambeth and South wark.	London-road - - L	19,190	–	1	1
Southwark and Lambeth.	Trinity, Newington -	22,675	–	1	–
Ditto - - -	St. Peter, Walworth W	44,463	–	1	–
Lambeth and Southwark.	St. Mary, Newington H	15,082	–	–	–
Ditto - - -	Waterloo-road 1st - -	15,269	–	1	–
Ditto - - -	Waterloo-road 2nd - -	18,640	–	–	1
Ditto - - -	Lambeth Church 1st -	19,839	–	–	1
Ditto - - -	Lambeth Church 2nd W	29,542	1	1	3
Southwark and Lambeth.	Kennington 1st - -	30,785	–	1	1
Ditto - - -	Kennington 2nd - -	20,440	–	–	–
Lambeth and Southwark.	Brixton - - - -	20,067	–	–	1
Lambeth and Wells -	Norwood - - W	7,462	–	–	–
Southwark and Wells	Clapham - - -	20,894	–	–	–
Ditto - - -	Battersea - - W *w*	19,600	–	–	3
Ditto - - -	Wandsworth - - L	13,346	–	–	–
Ditto - - -	Putney - - - -	6,481	–	–	–
Lambeth and Wells -	Streatham - - -	10,082	–	–	–
Wells - - -	Dulwich - - -	1,723	–	–	–
Southwark and Lambeth.	Camberwell - W L L	21,297	1	3	2
Southwark, Lambeth, Kennington, and Wells.	Peckham - - -	28,135	–	–	4
Lambeth and Southwark.	St. George, Camberwell -	20,333	–	4	3
Southwark, Kennington, and Wells.	Rotherhithe - - W	24,502	–	–	4
Kent and Southwark	St. Paul, Deptford - -	37,834	–	1	4
Kent - - -	St. Nicholas, Deptford -	8,139	–	1	1
Ditto - - -	Greenwich, West - H	21,696	–	1	1
Ditto - - -	Greenwich, East - W H	18,306	–	–	4
Ditto - - -	Woolwich Dockyard H	22,919	–	–	–
Ditto - - -	Woolwich Arsenal H	18,776	–	–	–
Ditto - - -	Plumstead - - -	32,974	–	–	–
Kent and Wells -	Eltham - - - -	3,009	–	–	–
Kent - - -	Lee - - - -	11,807	–	–	–
Wells - - -	Lewisham Village - W	7,372	–	–	–
Lambeth - -	Sydenham - - -	10,595	–	–	–

NOTE.—The letters placed against the names of the sub-districts ote public institutions situated therein, namely—

W—Workhouse.

H—Hospital.

L—Lunatic Asylum.

w—A workhouse not belonging to the district in which it is situated.

The following are Outlying Workhouses:—

St. George, Hanover-square, workhouse is in Chelsea North-west sub-district. 2 : 2.

The Strand Workhouse is in Tottenham-court sub-district. 9 : 2.

West London Workhouse is in Islington, East. 10 : 2.

East London Workhouse is in Hackney sub-district. 11 : 4.

St. Luke, Middlesex, Workhouse is in Hoxton New Town sub-district. 20 : 3.

London City Workhouse is in Mile End Old Town Eastern sub-district. 24*b* : 2 : and Bow sub-district. 25 : 1.

Stepney Workhouse is in Bow sub-district. 25 : 1.

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Week ending Saturday, 4 *August.*

The deaths registered in London during the week were 2,661. It was the thirty-first week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,395. The deaths in the present return exceed the estimated number by 1,266.

There is a slight increase in the high rate of mortality that ruled in the previous week. 1,053 persons died of cholera, 354 of diarrhœa, making 1,407 deaths from both forms of disease.

The deaths returned in the four last weeks from cholera were 32, 346, 904, and 1,053; from diarrhæa 150, 221, 347, 354. The deaths from cholera exceed by 149 the deaths in the previous week; the excess in the total deaths is only 61.

Of cholera and diarrhœa 573 children under 5 years of age; 114 boys and girls of the age of 5–10; 79 of the age 10–20; 255 men and women of the age 20–40; 248 of the age 40–60; 127 of the age 60–80; and 11 old people of 80 and upwards.

Deaths from diarrhœa or cholera in small numbers occurred all over the London districts; in Kensington, Marylebone, Pancras, Islington, Holborn, the numbers were considerable. In the West districts of London 12 persons died of cholera; in the North districts 46 (including 19 in Islington, 20 in Hackney); in the Central districts 31 (including 12 in St. Botolph; in the South districts 47 (including 21 in Deptford and Greenwich); while in the East districts 916 persons died of unequivocal cholera. Only 16 of the deaths from cholera occurred in one of the largest of the East districts, Shoreditch. The violence of the attack is still expended on Bethnal-green, Whitechapel, St. George-in-the-East, Stepney, Mile-end Old Town, and Poplar, including Bow. There is some subsidence in Poplar and Stepney, but increased virulence in Bethnal-green and Whitechapel. The attack has been circumscribed by nearly the same lines for three weeks in succession. This is no accident; the phenomena are due to some specific cause.

These violent outbreaks are almost invariably in England the result of contamination of the waters; and the question is subsequently noticed. Upon the assumption that the waters were at some time impure, there is this further aggravation, that in the lower districts the water is not carried away. "It is unfortunately," says Mr. Bazalgette, "the locality where our main drainage works are not complete." A temporary pumping station is to be erected forthwith, and will be in operation in about three weeks at Abbey Mills.

The East London waters have been analysed by Dr. Frankland, whose report is reassuring; and Mr. Greaves, the engineer, is fully alive to the extreme importance of pure water at the present moment. The waters of shallow wells and pumps are polluted; and in this crisis the health of London is very much in the hands of our hydraulic engineers.

The local authorities, who had not instituted generally house-to-house visitation, are now on the alert. The sympathy of the whole nation with the sufferers has been touchingly expressed by Her Majesty, and has been proclaimed by the Prime Minister. Under these auspices, and with the intelligent exertions of the people themselves, we may hope ere long to see the destructive progress of the plague stayed.

The Water Supply of the East Districts.—The cause of the epidemic of cholera consists, as is well known now, of a zymotic matter in various degrees of activity all over the London area; affecting the people in various ways, through air, contact, and water. Hitherto, in all great outbreaks here, the *chlorine,* which this stuff may be called, has been distributed chiefly through the water, as was shown in the Register General's reports on the previous epidemics.

When it was observed, therefore, that the present fatal explosion of cholera fell on the East districts in the first week, suspicion was aroused; and that was strengthened by the observations of the week ending July 28, and by personal inspection, which showed that the attacks were diffused over a wide area, among many people in bad hygienic conditions, and also among many in ordinary conditions, often well to do, living in streets by no means so poor or so dirty as the streets of the south and of other regions of London. The population was principally in the port of London, but not exclusively; and little more exposed to infection than the districts along the south side of the Thames, which had formerly been decimated by cholera, when the water supply on that side was polluted. The air of East London is often charged with impurities, which are undoubtedly noxious; and so are other parts; but any impurity of the air is rapidly diffused all over London.

Nearly all the infected districts are supplied by one water company, which now derives its water, not, as was stated last week, at Lea Bridge, where its filtering beds lie, but about 2¾ miles higher up the river, and above Tottenham. As far as Enfield the river is protected from sewerage by an intercepting drain; but it receives the drainage of all the country and towns in its basin.*

The New River takes a large portion of its supply higher up the Lea, and engages to deodorise the sewage of Hertford before it is discharged into the water. There is no such protection against the sewage of Ware. Upon the whole, the upper waters of the tributary Lea are not worse than the waters of the Thames, which are exposed to similar contaminations; and the filtering arrangements of the East London Company are elaborate, and probably as effective as those of the Thames companies. The 13 filter beds at Lea Bridge cover an area of 12 acres. A part of the water is distributed from the well of those beds by the most powerful engine of the company; the rest of the filtered water is carried three miles down to a covered reservoir of about 2½ acres at Old Ford, where it is distributed over the area now suffering so much from cholera. The water in this reservoir looks perfectly pure. Close by its side, which is well built, flows the tidal end of the Lea, black, and full of the foulest impurities.

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* Dr. Radcliffe has remarked that the Cobbin, which flows into the Lea through Waltham Abbey, drains Epping, where the late small outbreak of cholera was observed. That stream is said to be dry.

The company in its first years drew its waters mainly from the Lea at this point, and the first improvement was effected by carrying its intake up the river to Lea Bridge beyond the tidal range. The water was brought down an open canal by the side of Hackney-cut, and terminated in two large reservoirs on the other side of the black Lea. This canal and these reservoirs of about nine acres still exist; they are marked in the most recent map by Stanford as the "East London Waterworks canal," and the "East London Waterworks reservoirs." One of these reservoirs was recently emptied, and was filled again perhaps by springs or soakage. These old reservoirs are not, it is said, used, the covered reservoirs containing the only water fit for use; but the old reservoirs retain their old channels of communication with the pumping wells, and the company has the power in an emergency to distribute the water from the old reservoirs all over the region of the cholera field. But this the company professes not to do,—and it could scarcely be the result of accident, otherwise the diffusion of the waters of the old reservoirs over the area would afford a probable explanation of the sudden outbreak in East London.

It is a notable circumstance that the parts north of Victoria-park, supplied by the East London Company direct from their filter beds, have not hitherto suffered from cholera, notwithstanding contiguity to the infected districts, more than other districts supplied by other companies. This implies that the East London water as it leaves the filter beds is as good as any other water in London.

It is natural, as land is valuable in East London, to inquire why a commercial company has for many years retained some miles of a canal and nine acres of reservoirs for no purpose?—Mr. Greaves replies that the canal serves to carry off the waste of the filter beds, and that the company proposes to convert one of the old ponds into a covered reservoir. When this is done, and the other pond, which, we are told, is of no use, is filled up, or has no longer any connection with the pumping wells of the company, the public may well rest satisfied, until some great general reform is effected in the water supply of London. In the interests of the public health the country has a right to demand this security.

The following are Extracts from Letters which have been received from Professor Frankland, F. R. S,:—

"I have seen an abstract of the Registrar General's return. The mortality is frightful. I write to suggest the addition of permanganate of potash to the water in the Company's reservoirs. The amount required would be 80 lbs. of permanganate to every 1,000,000 (million) gallons of the water. The permanganate should be dissolved in a few hundred gallons of the water, and then run into the reservoirs with the rest of the water in such a manner as to get a thorough admixture. If the water retains a pink hue so much the better; it will lose it before it reaches the consumer; in fact the permanganate ought to be added until a pink tint lasting half an hour is obtained in the reservoir. The quantity may appear large, but it is of no use to employ a smaller amount. It should be applied, if possible, after filtration, and immediately before transmission to the consumer. Mr. Condy, near Battersea, manufactures this material largely, but I do not know if he could meet so large a demand.

"The expense of the permanganate at 1 *s.* per lb. will be considerable; but what is such an expense in the face of this mortality? It will cost much less than the disinfection of the London sewage, which was contemplated some time ago. Of course the effect of the permanganate is not a matter of certainty, but it is the only thing, capable in this emergency of such application, that I should have any faith in. It is quite innocuous, and could therefore do no harm. It is much better than boiling the water, even if that were possible, for water containing a slight leakage from a watercloset is not deprived of its noxious qualities by being boiled for a short time.

"When I state that permanganate is the only purifier in which I should have faith, I have regard of course to what is practicable in the present emergency, for, if its use were practicable, I should prefer filtration through animal charcoal, which, as you will see from my three recent reports, removes practically all organic matter. One and a-half tons of animal charcoal would be required for each 1,000,000 gallons sent out daily. The animal charcoal should be in grains about the size of blasting powder, and the filtered water would simply have to pass through the mass of this charcoal contained in a suitable tank. The London Water Purifying Company between the entrances to King's College and Somerset House use this material, and it is through one of their filters that the New River water passes for my monthly determinations. I think, after all, that such a mode of purifying the whole of a company's water is by no means an insuperable undertaking. The charcoal will continue to act for six months at least. It is the charcoal used by sugar refiners, and care should be taken that it is fresh, and has not been already used."*

Sir, Royal College of Chemistry, 4 August 1866.

In compliance with your request I have made a special analysis of the water supplied by the East London Company, and collected on the 1st instant. The following are the results, together

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* These extracts were immediately forwarded to Mr. Greaves.

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together with those yielded by the water supplied by the same Company on the 1st of July, and on the average of a whole year.

	Solid Matter in 100,000 parts.	Organic and other volatile Matter in 100,000 parts.	Oxygen required to oxidise the Organic Matter.	Degree of Hardness.
East London Company's Water, collected 1st August 1866 - - - - - - - -	26·14	1·44	·0328	17·7
East London Company's Water, collected 1st July 1866 - - - - - - - -	24·38	1·94	·0344	16·0
East London Company's Water (average of one year) - - - - - - - - -	27·98	1·62	·0504	21·12

It is the amount of organic matter contained in this water which is of especial importance in connection with the outbreak of cholera in the district supplied by this company. The above results show that, in this respect, the water supplied on the 1st of August is considerably better than that supplied on the 1st of July, when the amount of this ingredient was markedly above the average. Chemical analysis, therefore, although it shows a larger quantity of organic matter than ought to be contained in water used for drinking purposes, does not reveal any exceptional degree of pollution in this water. It must be borne in mind, however, that chemical investigation is utterly unable to detect the presence of choleraic poison amongst the organic impurities of water, and there can be no doubt that this poison may be present in quantity fatal to the consumer, though far too minute to be detected by the most delicate chemical research.

It is thus that the occurrence of cases of cholera, or of choleraic diarrhœa, upon the banks of any of the streams, from which the water supply of London is so largely derived, may at any moment diffuse this poison over large areas of the metropolis. For the prevention of such a catastrophe there is a method which deserves considerable confidence. In my last three monthly reports to you on the metropolitan waters, I have shown that filtration through *animal* charcoal (bone-black) removes, practically, the whole of the organic matter from the New River water; and in numerous other experiments, I have ascertained that this process is equally efficient even when applied to the foul waters of ponds and ditches. I have also proved that its action continues unimpaired for three months, and will probably last for a year, even when very large volumes of water are passed through it. *Animal* charcoal alone has this power; *vegetable* charcoal being perfectly inert.

I would, therefore, most earnestly recommend, that during the prevalence of cholera, the whole of the water supplied to the metropolis should be passed through animal charcoal immediately before transmission to consumers from the reservoirs of the respective companies. For this purpose 300 tons of bone-black in the condition in which it is used by sugar refiners would be required to purify the total supply of the metropolis, as I find that water passed at the rate of 1,000,000 gallons in 24 hours through three tons of bone-black is completely purified. This operation, even when performed upon the water supply of London (100,000,000 gallons daily), would be neither formidable nor expensive. Three or four days would suffice to fix the necessary filtering boxes, whilst the animal charcoal, being an article which is now manufactured on a very large scale, can be had on the shortest notice. It is scarcely necessary to add, that the water should be passed through the animal charcoal after it has undergone the usual process of filtration.

I have, &c.
(signed) *E. Frankland.*

In reply to an inquiry Mr. Bazelgette has favoured the Registrar General with a short account of the drainage of the cholera district.

"It is unfortunately just the locality where our main drainage works are not complete. The low-level sewer is constructed through the locality, but the pumping station at Abbey Mills will not be completed until next summer; therefore the drainage of the district does not yet flow into the low-level sewer. We are deodorizing the sewers and gullies freely with chloride of lime, and to-morrow I shall recommend the Board to erect a temporary pumping station at Abbey Mills to lift the sewage of this district into the Northern Outfall Sewer. This can be accomplished in about three weeks time.

"Yours faithfully,
(signed) *"J. W. Bazalgette."*

Week ending 11 *August.*

The deaths registered in London during the week were 2,299. It was the thirty-second week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,366. The deaths in the present return exceed the estimated number by 933.

The weekly deaths are declining. 2,299 deaths were registered last week; 2,661 in the week preceding. The death are less by 52 daily than they were in the previous week; and the whole of the decrement is accounted for by the fall of the deaths by cholera and diarrhœa from 1,407 to 1,045.

Of cholera 781, of diarrhœa 264 persons died last week; of both forms of disease 1,045;

which is less than the numbers in the previous week by 362, thus distributed in respect of ages: under 20 the decrease of children's deaths is 228; at 20–40, the decrease is 80; at 40–60, it is 42; at 60–80, it is 16; of old people of 80 and upwards the deaths have increased by four.

The decrease in the mortality of children is gratifying evidence of the good effects of increased care for their lives.

As the East districts were devastated to the greatest extent, they last week experienced the greatest relief; the deaths in them from the epidemic, including diarrhœa and cholera, fell from 1,041 to 774, and the decline is observable in each of the districts.

10,898 persons have died in London during the last five weeks; a number exceeding the corrected average by 4,213. Within the five weeks 3,116 persons died of cholera, 1,338 of diarrhœa. The mortality in the West districts was at the annual rate of 24, in the East districts at the rate of 82 per 1,000 inhabitants. In the West districts 225, in the East districts 3,182 persons died of cholera and darrhœa; the estimated population being respectively 511,258 and 607,945.

To facilitate the inquiry into the causes, and to supply information to those who are engaged in combating the epidemic, the particulars of every death in London are now published daily; all the deaths for instance registered on Monday in the districts of London from Fulham to Woolwich can be procured on Tuesday evening, by scientific men, at the Queen's printers.

The deaths registered from cholera in the East districts during the seven days of the week were 223 on Sunday and Monday, 114 on Tuesday; 90, 98, 71, and 78 on the four following days: in all London on the same days 249, 130, 109, 114, 84, 94.

No greater mistake could be made than to relax the efforts for combating the disease, or for relieving the distress which it has already wrought.

The Water Companies, Dr. Frankland has suggested, should filter their supplies through animal charcoal; and the suggestion is well worthy of the consideration of their engineers at this time, when the waters of no shallow wells can be used without risk. In epidemic districts the water butts should be emptied, disinfected, and refilled.

Week ending Saturday, 18 *August.*

The deaths registered in London during the week were 1,799. It was the 33rd week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,332. The deaths in the present return exceed the estimated number by 467.

The deaths are less by 500 than the numbers recorded in the previous week. The deaths by cholera have fallen from 1,053 and 781 in the two previous weeks to 455. The decrease of deaths by the two forms of cholera and diarrhœa is absolutely greatest in childhood, but relatively greatest in manhood. Thus the deaths under the age of 20 have fallen in the week from 538 to 373, at the age of 20–40 from 175 to 121, at 40 and upwards from 332 to 155. Thus this epidemic explosion which has slain in a few weeks so many people in the East, and has threatened the whole population of London, is subsiding. It has been felt in every district, but its great ravages have not yet extended beyond the original limits.

Mortality of the several London Districts from Cholera.

We may now venture to look back, and draw some deductions from the facts as they are recorded in the Table for the five weeks ending 11th August, during which 4,454 men, women, and children died of cholera and diarrhœa.

The mortality in the five weeks has been at the rate of 37 per 1,000 living annually; but in both the south and the west districts, covered by 1,400,000 people, the mortality has scarcely exceeded the average by 1 per 1,000. The annual rate of mortality by cholera was 1 in Kensington and Paddington, 0·3 in Chelsea, 0·4 in St. George, Hanover Square, 1 in Westminster, 0·5 in St. Martin-in-the-Fields, 1·5 in St. James, Westminster. The mortality from cholera and diarrhœa was highest in Kensington (6), and lowest (2) in St. James, Westminster, the scene formerly of the Broad-street pump mortality. The west districts are supplied chiefly by the Thames water companies, the New River supplying portions of St. James, Westminster, and St. Martin's.

The mortality in the southern districts by cholera was 3 in 1,000 in St. Saviour, Southwark, 2 in St. Olave, 2 in Bermondsey, 2 in St. George, Southwark, 0·3 in Newington, 1 in Lambeth, 2 in Wandsworth, 3 in Camberwell, 3 in Rotherhithe, 3 in Greenwich, where Mr. Glashier has observed the famous "blue mist," and 0·2 in Lewisham. The mortality by cholera and diarrhœa was highest in St. Saviour, Southwark (8), and lowest in Lewisham (1). These southern districts are generally poor, they lie low, and they were decimated by cholera in the epidemics of 1849 and 1854, wherever the impure water of the tidal Thames was distributed. Their water is now drawn above Teddington Lock from the Thames.

The five north districts fared nearly as the central districts; the mortality by cholera was 0·5 in Marylebone, 0·4 in Hampstead, 1·2 in Pancras, 1·9 in Islington, and 4·9 in Hackney. The mortality by cholera and diarrhœa was lowest in Hampstead (3), and highest in Hackney (8). These districts are chiefly supplied by the New River, one of the Thames companies, and a portion of Hackney, it is believed, from the Lea Bridge reservoir of the East London company.

The dense central districts are, some of them, such as St. Luke's, remarkable for poverty, others,

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others, such as the City of London within the walls, for their wealth. The mortality by cholera was at the rate of 1 per 1,000 in St. Giles, 2 in the Strand, 0 in Holborn (which appears to return all its cases as diarrhœa), 1 in Clerkenwell, 1 in S. Luke, 7 in East London, 7 in West London, and 2 in the City district. From cholera and diarrhœa the mortality was highest in the City without the walls (10), and St. Giles (9), lowest in the City within the walls (3). The whole of the central districts are supplied by the New River, which draws part of its supply from the Lea River and part from springs. The East London Company enters the City sub-district in St. Botolph, where a few deaths from cholera have been registered.

There are seven districts in the East; the mortality by cholera in the poor district of Shoreditch was at the annual rate of 4, by cholera and diarrhœa 8 in 1,000; five of its sub-districts are supplied by the New River, one partially, and one wholly by the East London, probably from Lea Bridge. In the rest of the east districts the mortality by cholera was at very different rates; it was at the rate of 39 per 1,000 in Bethnal-green, 50 in Mile-end, Old Town, 60 in St. George-in-the-East, 70 in Whitechapel, including deaths in the London Hospital from other eastern districts, 70 in Poplar and Bow, and 80 in Stepney. Bethnal-green is one of the poorest districts of London, if we may judge by the annual value of the houses; but the people of Bow and Poplar are not conspicuous for poverty. The whole of these districts where the mortality from cholera was from thirty to forty-fold higher than it was either in the west or the central, in the north or the south of London, were supplied with water from the Old Ford reservoirs. London is divided into 37 districts; 6 districts are supplied from Old Ford, and every one has been ravaged by the epidemic; the other 31 districts have for 6 weeks in succession suffered slightly. The 37 districts are sub-divided into 135 sub-districts; 21 are supplied with the same water, and have all suffered six weeks in succession; 115 sub-districts have suffered inconsiderably, except in Botolph and a few other districts, where the same water has crept in, and the mortality is partially swollen.

By the doctrines of chances, it is impossible that the coincidence between this particular water and the high mortality should be fortuitous in 135 cases during six weeks in succession.

The induction extends over all the area of observation in previous epidemics, where sewage water has so often led to cholera outbreaks.

The persistence of the epidemic in the East London districts is no proof that the supply of the Company is now worse than that of other companies, as its effects on the place, and on the population only subside slowly.

This great lesson should be taken to heart by every water company and every community in the kingdom. Unclean water cannot be consumed with impunity; its consumption is the sin of which cholera is the punishment.

Week ending Saturday, 25 August.

The deaths registered in London during the week were 1,477. It was the thirty-fourth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,304. The deaths in the present return exceed the estimated number by 173.

The mortality from cholera and diarrhœa is declining: 265 deaths from cholera and 129 from diarrhœa were registered last week. In the five preceding weeks the deaths from cholera were 346, 904, 1,053, 781, 455; the deaths from diarrhœa in the same periods were 221, 349, 354, 264, 194. Of the deaths registered last week from cholera and diarrhœa, 198 persons died from cholera, and 41 from diarrhœa in the East districts, 3 from cholera and 15 from diarrhœa in the West, 12 from cholera and 21 from diarrhœa in the North, 13 from cholera and 13 from diarrhœa in the Central, 39 from cholera and 39 from diarhœa in the South districts.

One hundred and fifteen young persons under 20 years of age died from cholera and 115 from diarrhœa; at the age of 20, and upwards, 150 deaths occurred from cholera and 14 from diarrhœa.

Week ending Saturday, 1 September.

The deaths registered in London during the week were 1,413. It was the thirty-fifth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,259. The deaths in the present return exceed the estimated number by 154. The excess is accounted for by 198 deaths from cholera.

The deaths from cholera during each of the last five weeks have been 1,053, 781, 455, 265, and 198; from cholera and diarrhœa 1,407, 1,045, 649, 394, and 326. The deaths from cholera and diarrhœa in 10 weeks have been 6,012.

Of the 198 deaths from cholera, six occurred in the West districts, 15 in the North districts, 9 in the Central districts, 122 in the East districts, and 46 in the South districts. While in the East districts cholera has declined rapidly, it is nearly stationary in the Southern districts, the deaths happening chiefly by the river at Deptford and Woolwich; where it is to be feared the authorities and the people are negligent. The pumps demand attention. Due care is not taken to prevent the diffusion of the cholera matter. Dr. Greenhill gives a remarkable instance of mortality due apparently to the introduction of a dirty cholera bed, thus enforcing the importance of the precept, burn all the dirty bedding and linen of cholera patients. Undoubtedly much credit is due to the people for their exertions in suppressing cholera; but with steadier efforts on their part, and on the part of the water companies, the disease will die out more rapidly.

CHOLERA AND THE LONDON WATER COMPANIES.

London is divided into fields among the water companies; the Chelsea Company, the Grand Junction, and the West Middlesex have the west districts; the Southwark, the Lambeth, and the Kent Companies have the south districts, for their respective domains: out of 10,000 inhabitants in each of these fields, six deaths occurred in seven weeks from cholera and diarrhœa, and the proportion in all the other fields except one is nearly the same.

The New River Company supplies nine north and central districts from the River Lea* and from springs; the deaths by cholera and diarrhœa out of 10,000 inhabitants in these districts were nearly eight.

The East London Company supplies six districts with the waters of the Lea, and the deaths out of every 10,000 inhabitants were 79; or, without calculation, the deaths were 415 out of 536,576 inhabitants supplied by the New River; the deaths were 3,721 out of 471,109 inhabitants supplied by the East London Company. The two companies are neighbours, and take their waters from the same Lea River.

Hackney, Shoreditch, and the East London Union are jointly supplied by the two companies; the deaths by cholera and diarrhœa were 10 in 10,000 inhabitants. But the East London Company sends water to these districts chiefly from Lea Bridge; and, strange to say, only its waters from the Old Ford reservoirs two miles down, have gone to the fatal districts. Every district to which these waters have gone has suffered in an extraordinary degree; the other districts have not suffered to a tenth of the extent.

It is of such vital importance to determine accurately the exact operation of the water in causing so many deaths, that Dr. Frankland has been requested to make a careful analysis of the East London water in the various reservoirs. This he has done, and briefly described the works in a very able paper.

Underground hydraulic works cannot be easily inspected, and still less easily described; much less can their operations, and the flow of their waters in past months, be now learnt. Mr. Greaves alone can write the history of these eventful weeks.

But nearly all that is really essential can be learnt from the papers in the Appendix. The Lea is formed by the confluence of five or six streams in Hertfordshire; divides Middlesex from Essex; and empties its residual waters into the Thames at Bow Creek. At Lea Bridge the East London Company has its 13 filter beds in two groups, one on each side of the Lea; they are fed by an open aqueduct which carries down the water two or three miles after it has passed through subsidence beds. In ordinary circumstances a part of this filtered water is distributed directly from Lea Bridge over "Tottenham, Hackney, Shoreditch, Haggerstone, during the day, and the whole of the Company's district during the night;" here cholera, in the parts north of Victoria Park, was not fatal. The rest of the water is conveyed down two miles or more of a large iron main to Old Ford, where it is lodged in a small covered underground reservoir, for distribution by three powerful pumping engines: the pipes of Old Ford inosculating freely with those of Lea Bridge, the water system in the pipes sways backwards and forwards at their juncture according as the waters above or below prevail.

What resource has the engineer if the filter beds in July refuse to act, or if, as lately happened to the New River, a main bursts, or if any accident happens to the complicated apparatus? This has to some extent been provided against. The waters of the aqueduct at Lea Bridge can be passed directly without filtration into the main; and as the waters from the filter beds at Lea Bridge are carried down the Company's canal to two large open reservoirs of nine acres at Old Ford, the water of these reservoirs can be used, as they can at once be thrown in any quantities into the pumping wells.

The bottoms of all the Old Ford reservoirs are much below the dirty sewage waters of the Lea at Trinity high-water mark; and Dr. Frankland shows the possibility of the accidental contamination of the waters of the covered reservoir. It is evidently as difficult to obviate this evil as to keep the upper waters of the Lea perfectly free from sewage like that which infests the Thames.

There is another hypothesis. During certain days of June or July, perhaps in the absence of the engineer, there was a hitch in the supply; and the waters of the two open, almost stagnant reservoirs, one filled by soakage in part from the Lea, were mixed with the comparatively purer water in the mains of the Company. This hypothesis is in accordance with all the known facts, and with the circumstance that the cholera began to subside in all his districts immediately after the engineer's attention had been directed to the dangerous state of the waters. If this hypothesis is rejected the Company can exercise no immediate control over its supply.

The East London Company is in the condition of a grand hotel which has one small cellar of good wine and two of bad vintages, which, as in the words of its manager, it never uses, "except in cases of emergency," its customers would be pleased to learn were suppressed.

The

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* 82 per cent. of their water in 1865 was drawn from the Lea. (Appendix to First Report of Commission on Pollution of Rivers, p. 37.)

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The open reservoirs near the Lea in communication with the pumps of supply at Old Ford are a public danger, not only to the population that has been decimated in the East, but to the population of all London, for the diseases they engender spread like fire. The reservoirs, as well as the canal, should be abolished and the water be stored somewhere else in safety.

LONDON.—TABLE showing the ESTIMATED POPULATION, 1866, the DEATHS Registered in the Seven Weeks ending August 25th, and the NUMBER of DEATHS in Seven Weeks to 10,000 Persons living, from all Causes, and from Cholera and Diarrhœa, in the several GROUPS of DISTRICTS Supplied chiefly by different WATER COMPANIES.

Number of Districts.	Companies Furnishing the Greater Part of the Water Supply.	Estimated Population, 1866.	Deaths registered in the Seven Weeks ending 25th August 1866.				Number of Deaths in Seven Weeks to 10,000 Persons living.			
			All Causes.	Cholera.	Diarrhœa.	Cholera and Diarrhœa.	All Causes.	Cholera.	Diarrhœa.	Cholera and Diarrhœa.
14	Districts supplied by the Thames Water Companies, viz.:—									
	5 (*a*) by Grand Junction, West Middlesex, and Chelsea.	615,604	2,024	57	311	368	32·9	·9	5·1	6·0
	9 (*b*) by Southwark and Lambeth -	638,292	2,194	142	273	415	34·4	2·2	4·3	6·5
18	Districts supplied by the Lea Water Companies, viz.:—									
	9 (*c*) by New River, drawing its water from upper part of Lea River (82 per cent.), from Chadwell Spring and other sources.	536,576	2,020	113	302	415	37·6	2·1	5·6	7·7
	6 (*d*) by East London from Old Ford Reservoir.	471,109	5,406	3,237	484	3,721	114·8	68·7	10·3	79·0
	3 (*e*) by New River and by East London from Lea Bridge.	271,617	1,022	158	117	275	37·6	5·8	4·3	10·1
3 (*f*)	Districts supplied by the Grand Junction, New River, and West Middlesex Companies.	269,537	868	36	130	166	32·2	1·3	4·8	6·1
2 (*g*)	Districts supplied mainly by the Kent Company from artesian wells, and partially by Southwark and Lambeth Companies.	235,256	640	93	44	137	27·2	4·0	1·9	5·9

(*a*) Comprising Kensington, Chelsea, St. George Hanover-square, Westminster, and Marylebone.

(*b*) Comprising St. Saviour, St. Olave, Bermondsey, St. George Southwark, Newington, Lambeth, Wandsworth, Camberwell, and Rotherhithe.

(*c*) Comprising St. Martin-in-the-Fields, a small part of which district is also supplied by the Chelsea Company, Islington, St. Giles, Strand, Holborn, Clerkenwell, St. Luke, West London, and London City.

(*d*) Comprising Bethnal Green, Whitechapel, St. George-in-the-East, Stepney, Mile End Old Town, and Poplar.

(*e*) Comprising Hackney, East London, and Shoreditch.

(*f*) Comprising St. James Westminster, Hampstead, and Pancras.

(*g*) Comprising Greenwich and Lewisham.

DR. FRANKLAND'S REPORT ON EAST LONDON COMPANY'S WORKS.

Royal College of Chemistry,
25 August 1866.

Sir,

AT your request I have made a careful inspection of the waterworks of the East London Company, and, in addition to my usual monthly analysis of the water as delivered to consumers, I have collected and analysed various samples taken on the 9th instant from the company's reservoirs, consumers' cisterns, and the River Lea. In this inspection I have been assisted by Mr. Valentin of this college, whose valuable aid, promptly and willingly given, I have much pleasure in here acknowledging.

The whole of the Company's works at Lea Bridge and at Old Ford were inspected on two separate days, viz., on the 9th and on the 23rd instant, but, as everything was in the same condition on the two occasions, it will not be necessary to describe the visits separately. On both occasions Mr. Greaves, the Company's engineer, and Mr. Maine, the manager of the works at Lea Bridge, gave, in the most courteous manner, every facility for the inspection of the reservoirs, filter beds, and machinery, and furnished, frankly and unreservedly, all the information asked for.

At Lea Bridge I found the water being brought to the Company's premises by a special open canal leaving the River Lea at Tottenham Mills, above the great sewage contaminations of the river, but below the outfall of the sewage from Hertford and Ware. I was informed by Mr. Maine that the sewage of the former town is deodorised by lime and then filtered before it flows into the river, but that the sewage of Ware enters the Lea without undergoing any purifying process.

The Company's premises at Lea Bridge are chiefly devoted to filtration, but there is also a magnificent pumping engine which raises and delivers a portion of the day supply and the whole of the night supply of the East London Company. There is no storage reservoir upon these premises, the whole of the water not raised by the pumping engine being transmitted as fast as it runs from the filter beds through a closed conduit down to a covered storage reservoir at Old Ford. There are 13 large filtering reservoirs at the Lea Bridge works. The area which they occupy is bisected by the River Lea, with which, however, the reservoirs have here no connexion. The filtering apparatus is of the most approved construction, and the filtered water is delivered into the so-called Essex and Middlesex Wells, situated respectively on the right and left banks of the River Lea in a condition of transparency, leaving nothing to be desired in this respect. In fact, so far as the removal of mechanically suspended matters from the water is concerned the result could not possibly be better.

The upper stratum of fine sand forming the floor of these reservoirs, and through which the water filters, requires frequent removal and cleansing, so that one or two of the reservoirs are usually empty and undergoing this operation. Mr. Maine told me that the rapidity of filtration from these reservoirs is very variable, and that in the month of July in every year a slimy matter very rapidly deposits upon the sand, blocking up its pores, and stopping the filtration altogether. In the month of August (according to Mr. Maine's clear and intelligent description) this slimy matter begins to grow, producing green confervoid fibres, such as I saw on the 23rd instant in the water of the filtering reservoirs, and especially upon the surface of the sand of one of them which was being cleaned. As soon as the confervoid growth begins, the filtering power of the reservoirs is entirely restored; but during the month of July, whilst the slimy matter continues to be deposited, the work of filtration is always, as Mr. Maine informed me, attended with great difficulties.

There are two provisions at the Lea Bridge works by which water from the special canal above mentioned can be transmitted without filtration to the storage reservoirs at Old Ford. One of these is an iron main at the canal head communicating with the main used for transmitting filtered water, and the other an open conduit or canal, formerly used to convey the whole of the water from Lea Bridge to Old Ford. From the condition of the sluice closing the iron main, I am convinced that no unfiltered water has been transmitted through that main for some months past. On the other hand, unfiltered water is frequently transmitted to Old Ford through the open conduit, for into this conduit the water from the filtering reservoirs is discharged whenever the latter require cleansing. It is scarcely necessary to remark that the water so discharged from the blocked-up filters is far more impure than the unfiltered water from the special canal, because the lighter portions of the suspended matter, from large volumes of water which have passed through the filter, are here concentrated in a comparatively small bulk, and as the open conduit down to Old Ford has much organic mud and slime in its bed, the water so trasnmitted down to Old Ford must be exceedingly impure when it arrives there. At Old Ford lock there is an overflow pipe which conveys this water into the River Lea, but there is also at the same place a sluice through which this water can be admitted into the uncovered reservoirs. From the nature of the mud deposited in these uncovered reservoirs I am inclined to believe that this water is sometimes admitted into them. Both Mr. Greaves and Mr. Maine assured me that no unfiltered water is ever now transmitted from Lea Bridge to Old Ford for the supply of the public.

The Old Ford Works may be described as a storage and pumping station, no filtering or purifying operations being here performed. There is a covered reservoir 2½ acres in extent, capable of containing water to the depth of 10 feet 6 inches, and when full the surface of the water is about 6 feet below the general level of the ground. Mr. Greaves informed me that, when the reservoir is filled to its highest point, the surface of the water is at the level of Trinity high-water mark. From this covered reservoir the water is supplied to the public by three pumping engines which furnish the greater part of the day supply of the East London Company. I observed fish of 3 or 4 inches in length swimming about in this reservoir. As already mentioned, there is a direct delivery to the public from Lea Bridge, which supplies Shoreditch, Hackney, Haggerstone, and Tottenham during the day, and the whole of the Company's district during the night; but, inasmuch as there is free communication between the branch mains of the Lea Bridge and Old Ford systems, there is no sharp line of demarcation between the two supplies. I was informed, however, that, owing to the hydraulic conditions of the two pumping stations, the above-mentioned districts would be mainly supplied from Lea Bridge; the rest of the East London Company's district would chiefly receive its day supply from the Old Ford reservoir; whilst Stamford Hill is always, on account of its elevation, specially supplied from Old Ford.

Along one side of the covered storage reservoir at the latter station, and within a few yards of it, runs the navigation branch of the River Lea, the water of which stands at about the same level as the water in the reservoir when the latter is completely filled. Pending the completion of the main drainage works, this branch of the river receives much of the sewage of the surrounding district, and being nearly stagnant is in a most offensive condition; in fact it is here little better than an open cesspool. A sample of the river water was taken at this point on the 9th instant; but the river had been flushed out at low water two days

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days previously, by which its condition had been greatly improved. The sample analysed, bad as it is, does not therefore represent the quality of the river water at this point in what may be called its normal condition of filthiness.

On the opposite bank of the river are the two large uncovered reservoirs of which mention has already been made. These reservoirs have a considerable deposit of mud, which is not, however, putrescent; one was full and the other partially empty; the latter, as I was informed, was being emptied by pumping into the River Lea. Communication can be established between these reservoirs and the pumping wells supplying the public, but Mr. Greaves assured me that it was never done, except in case of emergency. It was not done in the event of a fire, but he wished to retain the power of having recourse to these reservoirs in case of defective supply from the filtering apparatus at Lea Bridge. These reservoirs, as I am informed by Mr. Greaves, are excavated in gravel; they are consequently doubtless subject to considerable soakage, both from the River Lea, the surface drainage, and the sewage which here saturates the soil.

The samples of water collected on the 9th instant yielded, on analysis, the following results:—

Place of Collection.	Solid Matter in 100,000 parts.	Organic and other volatile matter (included in previous col.)	Amount of Oxygen required for Oxidation of Organic Matter.	Appearance of Water.
Uucovered North Reservoir -	24·64	1·07	·0452	Slightly turbid and of a milky appearance.
Uncovered South Reservoir -	25·56	1·53	·0564	Slightly turbid and milky.
River Lea at Old Ford - -	39 03	3·73	·2792	Very turbid. Suspended matter ·36 in 100,000 parts of the water.
Main leading from pumping engine at Old Ford. Water supplied to consumers.	25·91	1·14	·0204	Transparent.
Essex Well, Lea Bridge - -	24·85	1·19	·0220	Transparent.
Unfiltered water from Special Canal at Lea Bridge.	27·39	1·71	·0404	Greenish; slightly turbid.
Main in Stewart's Buildings, High-street, Bromley, where cholera had caused great mortality.	24·94	1·54	·0268	Dirty, depositing more sediment than the sample of unfiltered water from the canal at Lea Bridge.
Cistern at the Police Station, Poplar.	26·34	1·20	·0256	Transparent.

A comparison of the results yielded by the water from the canal at Lea Bridge with those obtained with the same water taken from the Essex well, after filtration, shows the important extent to which the water is purified by passage through the filtering reservoirs. The substitution of unfiltered for filtered water would at once increase the organic matter supplied to consumers to the extent of 43 per cent. With the exception of the dirty sample drawn from the company's main at Stewart's Buildings, and which contained the same amount of organic impurity as the water of the uncovered south reservoir at Old Ford, none of the samples of water upon the company's premises exhibit, in comparison with the Thames water supplied to the Metropolis, any excessive amount of impurity; but, as I have already pointed out in a previous report, chemical analysis, like every other mode of investigation, is powerless to detect the presence of matter like the choleraic poison amongst the organic impurities of water, for this poison may be present in quantity fatal to the consumer though far too minute to be detected by the most delicate chemical research. Further, when water has once become polluted by such matters, we possess no *certain* means, of a practical character, for destroying or rendering innocuous the poisonous matter. I have conclusive evidence that even boiling, which is generally regarded as the most efficacious means, will not prevent water which is so contaminated from producing violent cramp and diarrhœa.* The use of permanganate of potash or of animal charcoal, in the manner I have already recommended is the only practical means in which I should have much confidence for the removal of such noxious matters from water.

This impossibility of proving either the presence or absence of choleraic and other allied poisons in water, and the uncertainty of all processes for their removal, renders it the more important to guard with the most scrupulous care against the possibility of such contamination. It is precisely at this point that the otherwise excellent arrangement of the East London Company appear to me to exhibit some grave defects. I do not specially allude to the admission of the sewage of Hertford and Ware to the River Lea at a point above that whence the water supply is drawn, because this defect, though a serious one, is common to the Lea water and to the supplies drawn from the Thames; it is, in fact, an evil which cannot be avoided so long as we are content to obtain from rivers the water which we use for domestic purposes; but my remark applies to the retention of the means of supplying unfiltered and impure water at Old Ford station, and especially to the position of the covered storage reservoir at the same station from which the chief part of the daily supply is now drawn. I was astonished to find that the water, after being carefully brought down from Tottenham Mills in a special canal, purified by a most elaborate and efficient system of filtration at Lea Bridge, and then, to secure it from atmospheric impurities, conveyed in an iron main down to Old Ford, is stored in a reservoir sunk to the depth of some 16 feet beneath the low ground, which is here only just above the level of spring tides, and that when the reservoir is full, the level of the surface of the water in it only reaches that of Trinity high-water mark. This reservoir, as I was informed, is excavated in clay, but the side next to the navigation branch of the foul River Lea is of gravel. No doubt this is well puddled, and the brickwork sides executed in the best possible manner, nevertheless, the position of this reservoir, with its 2½ acres of floor 16 feet below the surface of a badly drained district is fraught with much peril during the prevalence of epidemic disease. Whatever precautions may have been taken, soakage to some extent must take place into such an excavation, and it was stated to me that when the reservoir is emptied, such soakage water, though not in large quantity, has to be removed by pumping.

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* This fact is not incompatible with the theory that choleraic and similar poisons are the germs of organisms, for it is well known that certain organic germs can develop into life after being boiled in water for a short time.

Such being the conditions of storage, the application of any temporary remedy is obviously surrounded with formidable difficulties. I satisfied myself that filtration through coarse animal charcoal could easily be applied, in the Essex and Middlesex wells at Lea Bridge, to the whole of the water supplied by the Company; but there would be little use in thus purifying the water at Lea Bridge when it has afterwards to be stored in the reservoir at Old Ford. It is only by passage through animal charcoal, as the water leaves this reservoir, that the advantages of the charcoal could be secured. Owing to the construction of the works at Old Ford, I was unable myself to form an opinion as to the possibility of such a filtration being carried out there at a short notice. Mr. Maine thought it could be accomplished without difficulty; but Mr. Greaves, who is much more likely to know, was of a totally different opinion, and thought that such a filtration could not be effectively carried out at Old Ford without the construction of new apparatus, which would require too much time to render it available during the present emergency. It is to be hoped, however, that means may be taken without delay, either to alter the place of storage, or to render practicable filtration through animal charcoal immediately before the water is supplied to consumers.

I have, &c.

The Registrar General. (signed) *E. Frankland.*

The following letter is from Mr. *Beardmore*, C. E., the engineer of the River Lea trust. I is in answer to queries the nature of which will be sufficiently evident:—

30 Great George-street, Westminster,
6 August 1866.

Sir,

In reply to the queries accompanying your letter of the third instant, I beg to say:—

1st.—"The River Lea Water Act, 1855," defines the quantities of water and priority of rights. By this Act, practically, the whole surplus waters of the Lea, excepting a comparatively small quantity for the navigation, was divided between the New River and East London Water Companies, and their power of supply was generally improved. They can also call on the trustees to execute any further works for amelioration on tendering the cost; the New River Company have exercised this power since last summer.

The companies can each take 23,000,000 gallons per diem, and beyond that quantity as much additional water as they can, gallon for gallon. Under the powers and with the proper use of reservoirs, the resources of the Lea are unlimited for a liberal and pure supply of the eastern metropolis.

Under the Act of 1855 the trustees and the Companies have greatly improved the depths and character of the water, and have made cuts so as to divide the navigation from the river. The reservoirs constructed by the East London Water Company within the past four years are very large and complete, but they have no connexion with the navigation.

As to your 2nd question.—The River Lea is divided into two portions, both as to its purity and its character as a water-bearing district. Above the parrallel of Tottenham and Walthamstow the valley is full of springs, and practically no sewage reaches the river, provided the New River Company work their purifying establishment at Hertford efficiently.

Although the New River takes a great portion of the Lea above Ware, yet it is so largely supplemented by boiling springs below Ware as to have greater volume by the time it arrives at Broxbourne than it had before the New River share was taken out.

On the whole, although there may be two or three small points worthy of amendment, as to drainage above the reservoirs of the East London Water Company at Walthamstow, I believe that there are few town supplies so pure as that of the East London Company.

Above Walthamstow, from one-third to one-fourth of the river must have boiled out of the earth as pure spring water within 18 miles' distance.

My connection with waterworks and examination of springs and rivers have been extensive for 30 years past, and I have seen few sources for which I should like to exchange either the Thames or the Lea. The carbonate of lime renders these waters somewhat hard, but is a wonderful safeguard against solution of impurity.

Below Tottenham, sewage passes into the river in a tangible form, and the scandalous proceedings of the Tottenham Local Board must be stopped.

It is at Old Ford, about five miles below Tottenham that the River Lea has become offensive at times, within the last few years, owing to the increase of buildings and factories within the metropolitan area; it also has the disadvantage of being tidal below Old Ford, and therefore liable to the inflow of impurity from the Thames, and from the sewage of Stratford and West Ham, which is turned into the Bow Creek arm of the Lee, without deodorization.

The trustees have found great difficulty in dealing with wrongdoers below Old Ford, for it has been evident that nothing effective could be done until the low level main drainage passing under the River Lea (near Bow) had come into operation. This, Mr. Bazalgette proposes to effect by temporarily pumping from the low level into the high level at Abbey Mills, and then into the Thames at Barking.

The District Boards in the East of London must now improve and alter their sewers, for the new main drainage will operate as if the entire area had been suddenly lifted about 20 feet, with a distant outfall.

Incidentally, I may remark that overcrowding, deficiency of drainage, and inferior articles of food are more likely to have promoted cholera than impurity or deficiency of water.

This district is populated by dock labourers, sailors, mechanics in the new factories, and great numbers of laundresses.

In answer to your 3rd question.—The volume of the Lea during the past six months has been unusually abundant. We had good floods during the winter, which are beneficial in sweeping off decayed matter. I have never seen the the river in better condition than during the past four months. The volume flowing down towards Walthamstow, is now more than double that of the corresponding period of last year, and after the Companies have taken all their supplies, there is a large surplus quantity still passing down the tidal channels into the Thames.

As to your 4th question.—The number of passages made by barges from Walthamstow upwards during the past six months would be about 2,500 against about three times that number in the lower portion of the river, chiefly grain, malt, bricks, &c. (Manure has been prohibited for 12 months past.)

But these barges pass up a canal, and do not enter any water taken by the East London until five miles above Walthamstow, and then again only for two miles out of the next six miles.

Nothing more occurs to me for your information, but I will call and personally tender my assistance, adding my own impression that if people drank more of the Companies' water in London, they would be the better for it.

I suspect that pumps are still common in the Bow and Poplar district, because of the fine vein of water in the sandy strata that overlies the London clay there.

I am, &c.
(signed) *Nath. Beardmore.*

The Registrar General.

The following Extracts are from the Second Report of the "Lancet" Commission. "Lancet," 25th August 1866, p. 218:—

"Passing along the River Lea from Hoddesdon, we come to the important towns of Ware, about five miles up, and Hertford two miles above this. The sewage of Hertford flows through the town to a place called the 'Filtering Bed,' in which it is professed to be deodorised by the New River Company. From this place it runs in an open cutting about 12 feet wide, to discharge itself a little above Ware. This sewage, when it passes into the river, is highly offensive, and causes much complaint from the inhabitants of Ware. The offensiveness of the river can be appreciated by any one standing on Ware bridge. The sewage of Ware itself is conveyed by three sewers to the river near the bridge. Below Ware the Lea receives the sewage from St. Margaret's and Stanstead Abbots."

"Below Hertford the River Rib flows into the Lea. This river runs for some miles through Hertfordshire in a southerly direction to Hertford, receiving in its course the river Quin. These streams bring the drainage from Buntingford, and the main towns and villages in this part of Hertfordshire. Just above Hertford, the Beane and Mimram flow into the Lea. The former flows to the Lea in a southerly direction; the latter in a south-easterly direction. The Lea itself rises in Bedfordshire, south-east of Chiltern Hills; and, passing through Luton, runs in a south-easterly direction through Hertfordshire, till it approaches Hatfield, in this county, when it pursues an easterly course to Hertford. It receives the drainage of Luton, Wheathampstead (and its paper mill), and, we believe, Hatfield in Hertfordshire, and with the Beane and Mimram, that of a number of villages. The Lea is navigable by means of a system of locks as far up as the Mill bridge, in the town of Hertford. Barges pass up the Lea and the Stort, carrying manure, bricks, timber, &c., into Essex and Hertfordshire, returning with malt, corn, wool, &c."

"At Waltham Abbey, the Cobbin pours into the Lea the sewage of this town and of Epping, in its most offensive state, but three miles above Ponder's End; and then, when there are added to these sources of pollution of the stream, the mills out of number along its banks, and the barges passing up and down the navigable river by a system of locks, which go far to give the character of a canal to the river, and to cause comparative stagnation of its waters, we have sufficient cause to wonder that the inhabitants of East London do not generally suffer more in health."

"Cobbin's Brook, which takes its rise in the country about Epping, is in parts but a narrow stream at present, while in other places it forms half stagnant pools. It receives the drainage of Epping, and about 50 yards from its outlet by an open ditch, that of the town of Waltham Abbey. The ditch from Waltham Abbey, which runs at the back of the church, and at least one house where death has been busy, is in such a condition as to occasion great complaint, and to cause it to receive in the neighbourhood the name of the 'cholera ditch.' In its present state the Cobbin is a very undesirable tributary of the Lea."

"The mention of Epping in connexion with an investigation of the influence of the river Lea upon the present cholera outbreak at once attracts our attention to the fact of the occurrence of cholera there last autumn. Whether there can be traced through the Lea and its tributary any connexion between that outbreak and the present one, we are not now prepared to say; but we believe that Theydon Bois, where the Groombridges lived, is on the other side of the watershed, and, if that be the case, its drainage must contribute, not to Cobbin's Brook, but to the Roding, which empties into the Thames direct."

The following statements from the local papers and from trustworthy witnesses are not unimportant, as they show that eels have passed through the pipes of the East London Water Company:—

From the "East End News," August 11th:—

CAN AN EEL PASS THROUGH A FILTER BED?

To the Editor of the "East End News."

"Sir,—SEEING the paragraph in your last week's impression respecting the purity of the water supplied us through the East London Waterworks that it is thoroughly filtered, I beg to contradict that statement, more particularly at this crisis, when cholera and diarrhœa are making such fearful ravages through these districts, in order that some steps may be adopted to guarantee a pure supply.

"Now, the second week in June last our water pipe was stopped up, and, as I am a plumber, I cut the pipe, and to my astonishment found a dead eel nine inches in length, which must have come through the above works, and which is quite demonstrative that the water is not filtered; so if you think this hint will be the means of the company improving the filtering, you will greatly oblige me by giving this publicity, as it is acknowledged by all scientific gentlemen as well as the faculty that it is essential to have pure water supplied.

"I am, &c.
(signed) *R. Furgusson*, Plumber."

"Bow-lane, E. I. Road,
"7 August 1866."

Mrs. Furgusson showed the cut pipe to a gentleman from the General Register office, and stated that the eel was putrid.

To the Editor of the "East End News."

"Sir,—As small beginnings sometimes lead to great ends, so a little information may perhaps lead to the most beneficial improvements in the sanitary condition of some portions at least of this great Metropolis; and I consider it to be the duty of every individual to furnish the authorities and the public generally with such information as he may be possessed of, as it appears to me to be the only means likely to bring about those changes so essentially necessary at any time, but more particularly so at present, when disease is carrying off so many of our fellow creatures.

"In your last impression a Mr. Furgusson speaks of an eel having got into the water pipe that supplied his dwelling. Now, strange as this may appear, I can bear testimony to a similar fact. A short time since the water supply to my residence was stopped, from what cause I could not imagine, and was without a supply five days. At length I took off the tap, and to my astonishment found an eel 14 inches in length. It was in a putrid state, and the stench arising from it was most fearful. Since that time I have lost two of my children, who died of cholera, and my wife and other members of my family have also been suffering from that disease.

I am, &c.

"3, Paradise-cottages, Gray-street, (signed) *Alexander Russell.*"
"St. Leonard's-road."

The eel was found at the end of the supply pipe of these cottages. It was seen by Mrs. Russell, who has just recovered from cholera. The date could not be fixed, but it was probably some months back.

EXTRACT from a LETTER of Dr. BAIN, M. D.

"I found to-day a house, No. 2, Wright's-place, Cotton-street, Poplar, where five in the family have had cholera, one of whom has died. I saw the mother of the family to-day, now recovered, who told me she had taken an eel from her waterbutt in June last about three inches long, which must have come through the tap.

"I send you a live eel which was taken to-day from a tap by a Mrs. Ames, Leicester-street, opposite to where you saw a woman dying. This Mrs. Ames had cholera about three weeks ago, and her brother is ill now with it."

A plumber recollects purchasing, some years ago, an eel taken out in his presence from the main of the East London Water Company. It weighed about 2 lbs., and was alive.

EXTRACT from the "Medical Times and Gazette," 1 September 1866, p. 226.

"On August 15th two fire plugs opposite Regent's-place, Commercial-road, were drawn, and a very considerable quantity of small 'mussel' shells, about the size of a shilling, were discharged, at least a bushel, according to an eye-witness. This is one of the things that the East London Water Company will be called upon to explain. Where did the shells come from? for it is wholly impossible that they could have been placed from without about the plugs. No doubt they had travelled along the supply pipe some distance."

COMMUNICATION of Cholera by Bedding.

Note communicated by Dr. Greenhill, M.D., Hastings:—

"A straw bed on which a woman had died of cholera was brought into the back room of No. 12, James-place, St. George-in-the-East, a small house which had recently been lime-washed, and which was certainly by no means one of the worst in the neighbourhood.

"The father sickens (I believe) the same night, probably August 2nd, and dies August 7th." (*Weekly Return*, p. 335.)

"A lodger who nurses him sickens, is taken to the cholera hospital, and recovers."

"Probably on August 5th, a little daughter sickens, and dies the next day." (p. 387.)

"On the same day a second little daughter sickens, lingers for six days, and dies August 12th." (p. 387.)

"Then a little nephew, who was staying with the family, sickens, and dies in three days, August 11th." (p. 387.)

"After a few days the daughter of the lodger sickens, and dies in three days, August 20th." (p. 428.)

"And lastly, another little girl, a friend or relation who lived next door, and who helped to attend on the last-mentioned girl, sickens, and dies in 12 hours, on August 18th." (p. 428.)

"The bed was probably not destroyed till August 15th or 16th.

Week ending Saturday, 8 September.

The deaths registered in London during the week were 1,335. It was the 36th week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,245. The deaths in the present return exceed the estimated number by 90.

The weekly deaths by cholera have fallen progressively from 1053, 781, 455, 265, and 198 to 157; by cholera and diarrhœa from 1407, 1045, 649, 394, 326 to 289. In the East districts the weekly deaths by cholera have fallen from 916 to 74; in the South districts from 47 to 39; in the rest of London from 90 to 44. The rate of mortality by cholera and diarrhœa in East London is rather more than double the mortality by those diseases in the whole of the metropolis. Of the deaths in the South districts an undue proportion is still observed; last week seven deaths by cholera, five by diarrhœa were registered in Deptford; seven by cholera and four by diarrhœa in Woolwich, where the rector states that active precautions are taken by the Health Committee. The efficiency of the measures in both these districts on the banks of the Thames should be closely watched. Last week the deaths by cholera in the Poplar district were seven, in Greenwich Union, including Deptford and Woolwich, 17.

Dr. Frankland has related a remarkable case in which boiling did not deprive cesspool stuff of its poisonous qualities. The experiment is decisive as far as it goes; and shows the importance of the absolute exclusion of sewage from water for domestic use. Boiling the water is a useful precaution, but Dr. Frankland prefers filtration through animal charcoal, or the use of the permanganate of potash.

Sporadic cases of cholera have been observed from the cause to which Dr. Frankland refers; in the dead of the winter of 1838, between 7th January and 5th February, 55 persons died of cholera in the Coventry House of Industry, evidently from common polluted water, as cholera was not at the time epidemic. In the Union Workhouse of Epping, cholera suddenly broke out on 5th August, 1854, and by the 14th destroyed 23 lives; "the well of the workhouse was close to the main sewer," and to this "dreadful state of drainage" the fatality of cholera was traced.* In this year epidemic cholera prevailed.

The drainage of a part of the cholera field by the low-level sewer will not be completed until next summer; but upon the present emergency, in answer to an application, Mr. Bazalgette informed the Registrar General that he should recommend the Metropolitan Board to erect "a temporary station at Abbey Mills to lift the sewage of this district into the northern outfall sewer."—[Letter, p. 280, Supplement to Weekly Return, No. 31.]

The pumping, it is gratifying to learn, was started on 24th August, as appears from the annexed letter. It would be an excellent arrangement, if it were practicable, to pump at least a part of the West Ham sewage into the northern outfall sewer, and thus further lessen the quantity of sewage in the Lea River.

Metropolitan Board of Works, Engineer's Department,
Spring Gardens, S.W., 7 September 1866.

Sir,

In compliance with the request made at this office yesterday, I beg to inform you that the temporary pumping engines for diverting the discharge of sewage from the River Lea and Limehouse Cut into the northern outfall sewer, near Abbey Mills, were started on the 24th ultimo.

I am, &c.
(signed) *F. W. Maul.*

The Registrar General.

The Registrar General has received the following letter from Professor *Frankland.*

Royal College of Chemistry, Oxford-street,
8 September 1866.

Sir,

In my report to you upon the water supply of the East London Company, dated 25th August, I stated that boiling will not prevent water which is contaminated with poisonous excrementitious matter from producing violent cramp and diarrhœa. The case upon which I founded this opinion is the following:—A gentleman and his wife partook of tea made with well water which was poured boiling from the tea-kettle into the teapot. Between three and four hours after partaking of the tea, and after they had been asleep for some time, they were both awoke by violent cramps, both in the limbs and body, which were soon followed by excessive diarrhœa. The cramps lasted for several hours, and the diarrhœa until the following afternoon. Both patients were affected in exactly the same way. The well-water was suspected, and the well, which was a very shallow one in slate rock, was at once opened and examined. It was soon found that a pipe from a water-closet had burst, and that some of the contents had made their way into the well; in fact, some fragments of excrementitious matter were found floating on the surface of the water. The water from this well was never again used, for the well was filled up, and another excavated at some distance, and the symptoms, which were entirely novel to the patients, never again occurred.

The attack took place in a very healthy locality in the country, and at a time when no epidemic diarrhœa or cholera prevailed. Were such an experiment tried now, the result can scarcely be doubted. I am intimately acquainted with the sufferers, and was at once informed of all the circumstances. The evidence afforded by this case is exceptionally conclusive; first, because the parties never, under any circumstances, drank this water except in the form of tea or coffee; and, secondly, because they were at the time the only inmates of the house, being without a servant; there can, therefore, be no doubt about the water having been boiled. The case excited my special interest on account of the unexpected conclusion to which it leads; and I mentioned it because it is important, at the present juncture, that we should not place implicit reliance upon a precautionary measure founded upon the assumption that the noxious qualities of the organic matters of sewage are destroyed by boiling.

I have, &c.
(signed) *E. Frankland.*

The Registrar General.

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* Letter of Mr. Windus, clerk to Epping Union, addressed to the Registrar General 1st November 1865. The water is now pure.

West Ham.

The registration district of West Ham properly belongs to London, with which it is intimately associated. Its four sub-districts are Walthamstow, Leyton, Stratford, and West Ham proper; at the north-east angle of London, it lies between Epping Forest and the Thames, the River Lea and the Roding at Barking, without touching Barking Creek. It has docks as well as manufactures; and at New Stratford are the extensive works of the Great Eastern Railway. West Ham has been by error left out of London; and in consequence sends down its ample sewage by an independent channel across the northern outfall sewer of the Metropolitan Board to an arm of the River Lea, which Mr. Beardmore, C.E., says, "has the disadvantage of being tidal below Old Ford, and is therefore liable to the inflow of impurity from the Thames, and from the sewage of Stratford and West Ham, turned into the Bow Creek arm of the Lea without deodorization."* By this unhappy arrangement the tide carries the sewage of West Ham up and down the River Lea, close to the reservoirs from which Stratford and West Ham proper get water.

The population of West Ham was 59,319 in 1861, and has since increased rapidly; at the rates of 1851 and 1861 it will be 81,718 in the year 1866.

Walthamstow to the north is supplied with water from a deep well, from springs, and in part from the Lea Bridge reservoirs of the East London Waterworks Company; Leyton is supplied partly in the same manner. The deaths from cholera in these two sub-districts were only 11 in the eight weeks ending 1st September.

Far otherwise was it at Stratford and West Ham proper, where the mortality in the last week of July was appalling enough; in one week 45 persons were killed in Stratford; 76 in West Ham, by cholera alone, exclusive of deaths by diarrhœa. The deaths by cholera to 10,000 living were 78 in Stratford, and 49 in West Ham proper, during the eight weeks ending September 1st. The particulars of each case are printed in the supplement. And the mortality should be compared with the mortality by cholera in each of the London districts. (See Tables, pp. 499, 500.)

Both Stratford and West Ham are detached from the Metropolitan drainage system, and have a system of drainage of their own. They are both supplied with water from the Old Ford reservoirs of the East London Company.

Population 1851, 1861, and 1866, and Number of Deaths by Cholera in the Eight Weeks ending 1st September 1866, in each of the Sub-districts of *West Ham.*

Sub-Districts.	Population.			Deaths Registered from Cholera in the Eight Weeks ending 1st September.	Number of Deaths in the Eight Weeks to 10,000 Persons Living.
	1851 Enumerated.	1861 Enumerated.	1866 Estimated.		
West Ham	34,393	59,319	81,718	367	44·9
Walthamstow	7,733	10,594	12,493	—	—
Leyton	6,108	7,536	8,413	11	13·1
West Ham	9,968	25,195	40,957	202	49·3
Stratford	10,586	15,994	19,855	154	77·6

Cholera and Diarrhœa in the Superintendent Registrar's District of Edmonton, during the 10 weeks ending 1st September 1866.

Note.—The Edmonton district is in the Lea basin immediately above the Hackney district.

The Registrar General requested the registrars of the Edmonton Superintendent Registrar's District to supply him with information as to the number of deaths from cholera and diarrhœa registered by them during the 10 weeks ending 1st September 1866, and to state the source of the water supply.

Hornsey.—Cholera, none; diarrhœa, seven, all children, the oldest one year. The whole of my district is supplied with water by the New River Company.

Thomas Richard Grimes, Registrar.

Tottenham.—Cholera, none; diarrhœa, 10. Water supply from artesian wells and the New River Company. There are some houses in parts of the district that still use what are termed surface wells, or wells supplied from the first bed of gravel. An order has just been issued that in a portion of the district these wells should be closed, the water being found to be unfit for dietetic purposes.

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* See the interesting letter of Mr. Beardmore, C.E., Engineer of the River Lea Trust, p. 455, of Supplement to Weekly Return, No. 53.

6th September 1866. *George Ross*, Registrar.

The following deaths have occurred since the above-named date; a male, aged 38 years, choleraic diarrhœa (14 days); and a female, aged four years, malignant cholera (9 hours). The latter case occurred in that part of my district where the water is considered unfit for use.

Edmonton.—Cholera, 1; diarrhœa, 3. The case of cholera was an imported one, the man being a waiter engaged to attend a cricket match on the Southgate grounds; he arrived from London in the morning, felt unwell, went to a chemist, took a draught, feeling better, returned to the grounds, drank freely of beer, was seized again in the evening, and died in 18 hours. The principal water supply is the old pump system from surface wells; a few houses obtain a supply by private arrangement from the New River Company, and a small portion from an artesian well. There is no public supply of water.

John Judd, Registrar.

Enfield.—Cholera, 1 (this case is said to have been brought from Stratford); diarrhœa, 4. The source of water supply for this district is, as to the town of Enfield and Ponders, from the waterworks of the Board of Health, the other parts from wells on the premises of the occupiers.

John Purdey, Registrar.

Waltham Abbey.—Cholera, none; diarrhœa, one child died 26th July, aged 13 weeks, debility from birth, diarrhœa (5 days). Diarrhœa has been prevalent in all parts of the sub-district of Waltham Abbey, but only one death from it. The water supply is good from the river Lea, and plenty of good springs and fountains in most parts.

Joshua Pegrum, Registrar.

Cheshunt.—Cholera, none; diarrhœa, several cases of slight diarrhœa, one severe case, but no fatal result. There is no public water supply to Cheshunt; the water consumed is mostly obtained from wells supplied by land springs on the premises of the occupiers. In some cases a supply is given by the New River Company to persons who apply and pay for the same.

Robert Archer, Registrar.

Week ending Saturday, 15th September.

The deaths registered in London during the week were 1,371. It was the 37th week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,218. The deaths in the present return exceed the estimated number by 153. This number is exceeded by the deaths in the week from cholera.

The first two weeks of September have hitherto been noted in cholera epidemics; in the first week of September 1849 no less than 2,026 persons died of cholera; in the first week of September 1854 the deaths by the same disease were 2,050. The deaths by cholera in the second week of the same years fell to 1,682 and 1,549. In 1866 we have been less unfortunate; the deaths sprung up with unexampled rapidity, threatening all London with devastation, and then less suddenly, but decisively, subsided. The deaths by cholera in the two first weeks of September were 157 and 182. 132 and 110 persons died in the same weeks by diarrhœa. Of the deaths by cholera, 10 occurred in the West Districts, 27 in the North, 20 in the Central, 77 in the East, and 48 in the South Districts. To ensure its rapid decline, the utmost vigilance is required on the part of the people, the health officers, and the Board of Works.

It is very desirable to know what proceedings have been taken by the authorities, not only in drawing up regulations, but in seeing to their execution. The health officers of London have supplied the Registrar General with some information having an immediate practical bearing; it will be found in the supplement.

RISE and DECLINE of CHOLERA in LONDON.

Cholera has been very unequally distributed over London; it has been in every district, but it is only in the field of one water company that the violence of the epidemic recalled the ravages of 1849 and 1854, when nearly the whole of the water was unfiltered, and when much of it was drawn from parts of the Thames and its tributaries polluted with sewage. The cholera matter was in those years diffused over London in large quantities, and the mortality pursued its course only checked by treatment of diarrhœa in the early stage of the malady.

Appendix, No. 8.

The Lambeth and the Southwark companies in 1849 could not improve their water supply; the ground was undrained; the pumps were polluted; and the epidemic pursued its natural course. It first appeared in the autumn of 1848, subsided partially to break out again in the summer of 1849, when week after week it grew more fatal, until in the first week of September it killed, reckoning diarrhœa, 2,298 persons. The Lambeth water was drawn in 1853–4 from a purer source, and the mortality by cholera was immediately shown to have declined in the districts it supplied;[*] but no great change was made in the character of the water during the course of the epidemic, which was less fatal, and pursued its usual course, culminating in September.

Nearly the same general law of development in 1866 was observed in the districts of the south, the centre, the north, and the west of London, with this exception, that in none of these districts did the mortality approach the dimensions of previous epidemics. There it justified the anticipations that had been indulged. In the midst of this calm the whole of London was startled in the three successive weeks of July by 346, 904, and 1,053 deaths from cholera; and it was found that the great majority of deaths happened in the houses supplied from the reservoirs at Old Ford belonging to one Company.

To make this investigation more exact, the deaths happening on each day in each of the fields of water supply have been taken out, and are given in the Table, p. 547: the dates of death extend from 1st July to 1st September. Three deaths from cholera happened on Wednesday, 11th July; 6 on the 12th; 12, 11, 12 on the three following days, in the districts supplied by the East London Company, including West Ham on the east side of the Lea. On Monday and the six days following, the deaths ran up to 31, 54, 59, 83, 91, 104, 104. On 23rd July there was again an increase; the deaths were 130 on Monday, 144 on Tuesday, 166 on Wednesday, when there was a slight subsidence; but on Monday, 30th July, the deaths were 141, on Tuesday 171, and on Wednesday, 1st August, 170.

It appeared then right to call attention at once to the complete coincidence of the cholera field with the field of supply of the East London Water Company, in the hope that the state of its water might be immediately looked to. The weekly report was published on Wednesday morning, 1st August; on that day the engineer of the Company called at the General Register Office; and on the day following he published a letter in the daily journals showing that he fully appreciated the importance of the crisis. The supply might have been changed on Wednesday morning, but on that day no result appears; the deaths were 170; on Thursday the deaths fell to 155, on Friday to 114, on Saturday to 112, on Sunday to 119, on Monday 6th August, to 115, on Monday, 13th August, to 44, on Monday, 20th August, to 31, on Monday, 27th August, to 21, on Saturday, 1st September, to 8.

This coincidence between the intervention of Mr. Greaves and the decisive declension of the cholera in the week following deserves to be noted. It strengthens the circumstantial inference that a part of the supply between 8th July and 1st August was drawn from the uncovered reservoirs; but the unclean matter might of course have entered the water through other unknown channels.

No corresponding rise or fall was observed on the same days in the other fields of water-supply.

The covered reservoir at Old Ford, said to be 2½ acres[†] in area, and 10½ feet deep, will not hold more than about 7,126,100 gallons of water; and the company supplies 90,174 houses with 20½ million gallons daily. The uncovered reservoirs it is said cover nine acres; they are seen from the Great Eastern Railway, but are not depicted either in Mr. Milne's map, or in that of the Government engineers.

The depth of the uncovered reservoirs is unknown; but they contain perhaps three times as much water as the covered reservoir.

The system of the Company consists of the water in the reservoirs, in the mains, in the multitudinous pipes, and in the butts of the consumers' houses; through these channels the matter must have been distributed irregularly; and it will be shown subsequently how slowly any zymotic matter once introduced is eliminated from the water or from the population.

The only sure method is to let all the water run off simultaneously, and to let the fresh supply be scrupulously pure. This, with complete drainage, gets rid of the zymotic stuff most expeditiously.

Now the epidemic has partly subsided in the East, and the Company's water, as far as we can judge of its effects, is returning to the normal state, it is desirable that Mr. Greaves, who is deservedly held to be one of the best practical hydraulic engineers of the day, and whose truthfulness, in questions of science, no one would question, should be permitted by the Company to publish all the facts of the case.

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[*] *See* Supplement to Weekly Return, 19th November 1853; also Weekly Return, 14th October 1854.

[†] The area of the covered reservoir is 2·5 × 43,560 square feet; which, multiplied by 10·5 feet deep, gives 1,143,450 cubic feet, or 6·2,321 × 1,143,450 = 7,126,100 gallons. For area and depth, *see* Dr. Frankland's Report.

The difficulties of supplying 21 million gallons of pure water daily from the Lea, with only one small reservoir, holding a third part of the day's supply, below, and in close juxtaposition to the tidal portion of that river full of foul sewage, in all seasons of the year, are immense; and, in the conditions given, casualties which no skill can entirely avoid, are almost inevitable.

In reply to a circular from the Registrar General, the London Medical Officers of Health furnished the department with information relative to the water supply and causes of cholera mortality in their districts.

DAILY DEATHS from CHOLERA in the Fields of the different WATER COMPANIES.

—	Grand Junction, West Middlesex, Chelsea.	Southwark, Lambeth.	New River.	New River, East London.	Grand Junction, New River, West Middlesex.	Kent, Southwark, Lambeth.	East London, including West Ham.	TOTAL.
July 1 -	–	–	–	–	–	–	–	–
2 -	–	–	–	–	–	–	–	–
3 -	–	–	–	–	–	–	–	–
4 -	–	–	–	–	–	–	–	–
5 -	–	1	–	–	–	–	–	1
6 -	–	–	–	–	–	–	–	–
7 -	–	–	–	–	–	–	–	–
8 -	–	1	–	–	–	–	–	1
9 -	2	–	–	1	–	–	–	3
10 -	–	–	–	–	–	–	–	–
11 -	–	–	–	–	–	–	3	3
12 -	–	1	1	–	–	–	6	8
13 -	2	3	–	1	–	–	12	18
14 -	–	4	–	–	–	–	11	15
15 -	1	1	–	1	–	–	12	15
16 -	1	–	1	1	–	–	31	34
17 -	–	2	–	3	–	1	54	60
18 -	1	3	–	–	–	1	59	64
19 -	4	3	–	2	–	–	83	92
20 -	2	3	–	–	–	1	91	97
21 -	3	4	3	2	–	2	104	118
22 -	2	4	2	2	1	–	104	115
23 -	2	3	2	2	4	1	130	144
24 -	1	1	3	2	1	1	144	153
25 -	2	6	1	4	1	3	166	183
26 -	4	4	–	3	1	3	155	170
27 -	–	5	3	4	2	4	125	143
28 -	1	3	7	3	–	2	157	173
29 S. -	–	4	7	3	1	3	151	169
30 M. -	4	1	2	4	–	6	141	158
31 T. -	2	5	5	13	3	1	171	200
Aug. 1 W. -	4	4	10	12	1	3	170	204
2 Th. -	3	3	4	12	–	2	155	179
3 F. -	1	2	7	5	–	3	114	132
4 S. -	–	3	3	3	2	4	112	127
5 -	2	6	6	6	1	3	119	143
6 -	–	3	4	4	3	1	115	130
7 -	–	3	3	9	1	3	84	102
8 -	–	6	6	8	1	1	93	115
9 -	1	3	–	4	1	2	91	102
10 -	1	2	3	1	–	–	72	79
11 -	–	2	1	3	1	2	67	76
12 -	3	3	1	1	4	3	71	86
13 -	–	3	2	6	–	2	44	57
14 -	1	2	–	3	–	1	38	45
15 -	1	9	4	–	–	6	50	70
16 -	2	3	3	2	1	4	44	59
17 -	–	5	2	2	1	2	38	51
18 -	–	1	4	4	–	3	39	51

Appendix, No. 8.

DAILY DEATHS from Cholera in the Fields of the different Water Companies—*continued.*

—	Grand Junction, West Middlesex, Chelsea.	Southwark, Lambeth.	New River.	New River, East London.	Grand Junction, New River, West Middlesex.	Kent, Southwark, Lambeth.	East London, including West Ham.	TOTAL.
Aug. 19 -	–	1	1	1	–	3	24	30
20 -	–	1	1	5	–	3	31	41
21 -	2	–	2	3	–	2	24	33
22 -	–	4	1	1	1	5	25	37
23 -	–	–	–	3	–	–	30	33
24 -	–	2	–	3	1	3	20	29
25 -	–	4	–	2	–	7	11	24
26 -	2	4	3	1	–	1	23	34
27 -	–	3	1	1	–	4	21	30
28 -	4	–	1	1	–	2	15	23
29 -	1	4	2	3	–	3	23	36
30 -	3	2	1	1	–	5	10	22
31 -	2	4	2	1	1	6	7	23
Sept. 1 -	3	6	2	2	–	2	8	23

Note.—The return for the first days of July does not contain all the cases of choleraic diarrhœa.

PROBLEM.

A full vessel contains x gallons of pure water; a gallon is poured out and is replaced by a gallon of impure water, which is mixed completely with the pure water; this operation is repeated m times: then the operation is reversed, and the liquor drawn off is every time replaced by a gallon of pure water for n times: how much impure water and how much pure water remain at the end of the $(m + n)$ operation?

Taking a as 1, or any proper fraction, let ax be the quantity of pure water remaining after the first operation, then a^2x will remain after the second operation, and a^mx after the m^{th}; as the vessel is still full, the quantity of impure water is $x - a^mx = (1 - a^m)\,x$. In the reverse operation the impure water is continually diminished in the constant ratio a, and after the first change becomes $a\,(1 - a^m)\,x$; after the second $a^2\,(1 - a^m)\,x$ . . . . . after the n^{th} change, that is the $(m + n)^{th}$ operation, the quantity of impure water is $a^n\,(1 - a^m)\,x = (a^n - a^{m+n})\,x$. As in the reverse operation the impure water is replaced by pure water, the quantity of pure water is found by subtraction to be—

$$= (1 - a^n + a^{m+n})\,x$$

If, instead of replacing the gallons of water withdrawn in the first m operation with impure water, a solution of arsenic is substituted, or a solution of a given quantity of any substance, then if the proportional part of the arsenic or other matter in 1 measure of water is expressed by q, then $q\,a^n\,(1 - a^m)$ will give the proportion of that substance in every unit of the solution, and the total in x such units of the solution by weight will be $q\,a^n\,(1 - a^m)\,x$, and the weight of pure water will be—

$$\left\{1 - q\,a^n\,(1 - a^m)\right\}\,x$$

Putting $x = 1$ and $a = {\cdot}9$, and assuming the unit of water at first to be pure, the quantities of pure water will fall respectively at every operation from 1·000 to ·900, to ·810, to ·729 at the third operation; when the impure water will from 0 become ·100; ·190; ·271; now reversing the operation, after three repetitions the impure water will become ·2439; ·21951; and ·197559. Assume that of the impure water ·01 by weight is arsenic, then the quantity of arsenic in 1,000 lbs. of the liquor will in three operations increase from zero to lb. 1·00, lb. 1·90, lb. 2·71; and after repeating the reverse operation three times, fall to lbs. 2·439, lbs. 2·195, lbs. 1·976.

For arsenic substitute cholera matter, say for shortness *cholrine*,* and the result will be the same.

But *cholrine** is unlike arsenic in this respect; it has the power of multiplying itself in the bodies of men, varies in strength, and undergoes changes in its activity.

It will be observed that the quantity of poison increases faster than it decreases; and that the velocity of both changes increases as a decreases in value. A similar law is observed in the rise and decline of cholera.

When $a = 0$ this implies that the whole of the liquor is changed at one operation; and when $a = 1$ this implies that the original liquor is unchanged.

Week

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* *Cholerine* is not now used for a mild form of cholera, as in that sense it is useless; but to prevent ambiguity *cholrine* may be used as the name of the matter producing cholera.

Week ending Saturday, 22nd September.

The deaths registered in London during the week were 1,350. It was the thirty-eighth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,206. The deaths in the present return exceed the estimated number by 144. This number is exceeded by the deaths in the week from cholera.

The deaths returned in the four last weeks from cholera were 198, 157, 182, and 150; from diarrhœa in the same periods, 128, 132, 110, and 98. The deaths from cholera are less by 32 than the deaths from that disease in the previous week. Of the deaths registered last week from cholera and diarrhœa, 14 persons died from cholera, and 11 from diarrhœa in the West districts; 28 from cholera, and 19 from diarrhœa in the North districts; 19 from cholera, and 17 from diarrhœa in the Central districts; 56 from cholera, and 24 from diarrhœa in the East districts; 33 from cholera, and 27 from diarrhœa in the South districts.

Fifty-three young persons under 20 years of age died from cholera, and 81 from diarrhœa; at the age of 20 and upwards, 97 deaths occurred from cholera, and 17 from diarrhœa.

Woolwich, unlike the other parts of the metropolis, had no Medical Health officer at the time of the outbreak of cholera. But the Board of Works, on the appearance of the first case of cholera in London, appointed a committee, who made the two Union officers health officers for the time being, and took other active steps to combat the threatening epidemic. In the case of Brewer-place, where six deaths from cholera occurred, it is admitted that there was some delay in the application of proper measures. Four deaths from cholera occurred last week in Woolwich; 10 in Deptford.

Week ending Saturday, 29th September.

The deaths registered in London during the week were 1,418. It was the thirty-ninth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,239. The deaths in the present return exceed the estimated number by 179.

One hundred and seventy-seven deaths from cholera, and 67 from diarrhœa, were registered during the week. Of these, 12 deaths from cholera, and nine from diarrhœa, occurred in the West; 36 from cholera, and 11 from diarrhœa in the North; 28 from cholera, and 17 from diarrhœa in the Central; 55 from cholera, and 18 from diarrhœa in the East; 46 from cholera, and 12 from diarrhœa in the South districts. During the last 13 weeks, 4,714 persons have fallen victims to cholera, and 2,298 deaths were caused by diarrhœa.

The cholera matter is now diffused very equally all over London; and as the waters of the upper Thames, of the Lea, and of the wells become infected, the utmost exertions of the authorities will be required to ensure its decline. Each health officer should consider that the safety not only of the people of his own district, but of three millions of people depends on his activity. It is to be regretted that these inadequately-paid officers cannot devote the whole of their time to the duties of their important office.

COBBIN'S BROOK.

The following note occurred in the Supplement to the Weekly Return, No. 31 (p. 277), in reference to a statement by Mr. Radcliffe, who reported to the Privy Council officially on the Epping cases of cholera:—"The Cobbin, which flows into the Lea through Waltham Abbey, drains Epping, where the late small outbreak of cholera was observed. That stream is said to be dry."

This note has given rise to some controversy. Mr. Beardmore, the engineer of the Lea River Trust, said the brook was "dry." The "Lancet" Commissioner (Supplement to Weekly Return, p. 456), after personal inspection, stated that Cobbin's Brook, which takes its rise in the country about Epping, is in parts but "a narrow stream at present, while in other places it forms half stagnant pools. It receives the drainage of Epping, and about 50 yards from its outlet by an open ditch, that of the town of Waltham Abbey."

Mr. J. Fowell Buxton writes to the Editor of the "Times":—

COBBIN'S BROOK.

"To the Editor of the 'Times.'"

"Sir,—Since it is of the utmost importance that all the facts relating to the origin and spread of choleraic infection should be stated with the greatest attainable accuracy, I venture

Appendix, No. 8.

ture to occupy, with your permission, a few lines in which to correct an error that, originating with the Registrar General, has been frequently repeated in your columns.

" It is said that the choleraic poison may have been brought by the Lea and its branch, Cobbin's Brook, from Epping, where occurred the cases that attracted so much attention last autumn. For two reasons this is impossible. In the first place, the Cobbin, throughout the six or seven miles of its bed, from near Epping to Waltham, never flows at all unless it be after an excessive and long-continued rainfall.

" But, supposing that the contents of the pools of last year are by this time filling the pipes of the East London Water Company, there is still no need for alarm ; for, secondly, the outbreak of cholera occurred, not in Epping, but in Theydon parish, which lies entirely within the basin of the Roding,—so that if water is the vehicle of choleraic infection, it will have to be discovered by the dwellers near Barking Creek.

" I am, &c.
" *J. Fowell Buxton.*

" Warlies, Waltham Abbey,
" 12 September."

Mr. Radcliffe, on this, explains :

" Sir,—Three of the fatal cases in the outbreak of cholera at Theydon Bois last autumn occurred to the north of the spot marked Epping Mill in the Ordnance map of the district, just beyond the crest of the hill northwards, and overlooking the slope from the eastern extremity of which springs one of the principal branches of the Cobbin's Brook."

Mr. Radcliffe called attention to the brook, as deserving notice, at a time when the cause of the great outbreak of cholera in East London was unknown. Cobbin's Brook contributed slightly to the usual impurities of the Lea, and did nothing more. The evil had its origin at the Old Ford Reservoir.

ELEVATION and WATER SUPPLY.

It was shown in the Cholera Report to the Registrar General (pp. lxi—lxvi), and in the Appendix to his Seventeenth Annual Report (pp. 88—90), that the mortality of the several districts of London from cholera diminished in the several districts supplied from the same sources in proportion to the elevation of the soil on which the houses were built.

This seemed to imply necessarily that the cholera matter (cholrine) was not in solution but in suspension in water, and comported itself very much like the well known rice-water when mixed in water.

The same law has hitherto been observed in this third epidemic, as is shown in the annexed Table. The mortality in the lowest sub-district (2 feet), St. John (St. George-in-the-East) was 193 deaths in 10,000 inhabitants ; while it was three or four per 10,000 in Stamford-hill (76 feet), which is said to be supplied from a reservoir about 96 feet above Trinity high-water mark filled at intervals from Old Ford.

TABLE, showing the MORTALITY from CHOLERA in Sub-Districts of different Elevations, supplied chiefly wi
Water by Nine Companies in 1849 and 1853½-54.—(Reprinted from Registrar General's Seventeen
Annual Report, Appendix, p. 97.)

Signature of Water Companies.	Name of Company and Source of Supply.	Years.	80 feet and upwards.	60 to 80 feet.	40 to 60 feet.	20 to 40 feet.	10 to 20 feet.	3 to 10 feet.	Un 3 fe
			Mortality by Cholera to every 10,000 Inhabitants.						
N.	New River - - - (Springs, Artesian Wells, and River Lea.)	1849	(4)* 18	(14)* 25	(17) 42	(8) 72	(2) 73	—	—
		1854	11	30	14	19	67	—	—
H.	Hampstead - - - (Springs, Artesian Wells, and New River.)	1849	(2) 16	(1) 26	—	—	—	—	—
		1854	10	7	—	—	—	—	—
E.	East London - - - (River Lea at Lea Bridge.)	1849	—	(1) 23	(4) 46	(15) 60	(4) 67	(2) 75	(1)
		1854	—	17	18	31	66	56	

* The small figures of this Table represent the number of sub-districts at each elevation supplied by the respective companies.

TABLE, showing the MORTALITY from CHOLERA in Sub-Districts of different Elevations, &c.—*continued.*

Signature of Water Companies.	Name of Company and Source of Supply.	Years.	80 feet and upwards.	60 to 80 feet.	40 to 60 feet.	20 to 40 feet.	10 to 20 feet.	3 to 10 feet.	Under 3 feet.
			Mortality by Cholera to every 10,000 Inhabitants.						
J.	Grand Junction - -	1849	(1) 7	(5) 14	(2) 14	–	–	(2) 22	–
	(Thames, 360 yards above Kew Bridge.)	1854	2	57	16	–	–	82	–
W.	West Middlesex - -	1849	(5) 11	(5) 20	–	(1) 33	(1) 18	(3) 31	–
	(Thames, at Barnes, 1¼ miles above Hammersmith Bridge.)	1854	11	18	–	49	34	74	–
C.	Chelsea - - - - -	1849	–	–	–	–	(6) 38	(1) 72	(1) 62
	(Thames at Battersea.)	1854	–	–	–	–	44	54	63
S.	Southwark - - - -	1849	–	–	–	(1) 70	(2) 58	(3) 148	(4) 171
	(Thames at Battersea.)	1854	–	–	–	109	44	174	170
L.	Lambeth - - - - -	1849	(2) 8	(1) 171	–	–	–	–	–
	(Thames at Thames Ditton, 3 miles beyond the influence of the tide.)	1854	28	19	–	–	–	–	–
S. & L.	Southwark and Lambeth -	1849	–	–	(1) 55	–	–	(5) 95	(12) 147
	(Thames at Battersea; and Thames at Thames Ditton, 8 miles beyond the influence of the tide.)	1854	–	–	39	–	–	97	103
K. & S.	Kent and Southwark - -	1849	–	–	(1) 41	–	(2) 112	(2) 67	–
	(Ravensbourne, below Lewisham Mills; and Thames at Battersea.)	1854	–	–	41	–	40	134	–
Wells.	Wells, pumps, and other sources - - - -	1849	–	(1) 6	–	–	(1) 62	–	–
		1854	–	–	–	–	41	–	–

The Table may be read thus:—The New River Company supplied 14 sub-districts on an average elevation ranging from to 80 feet above high-water mark, and in those sub-districts the mortality by cholera in 1849 was on an average 25 in ,000 inhabitants; in 1854, 30 in 10,000 inhabitants. At the lower elevation of 40 to 60 feet the mortality by cholera in sub-districts was 42 in 1849, and 14 in 1854, in every 10,000 inhabitants.

DEATHS from CHOLERA in the 10 Weeks ending 15th September to 10,000 Persons living, at different Elevations in the Fields of the Water Companies.

Companies furnishing the Greater Part of the Water Supply.	Elevation in Feet above Trinity High-water Mark.							
	Under 3 Feet.	3–10	10–20	20–40	40–60	60–80	80 and upwards.	Not stated.
	Deaths in 10 Weeks to 10,000 Persons living.							
and Junction, West Middlesex, and Chelsea - - - - - -	2·04	2·75	1·74	1·16	·86	1·51	1·10	—
w River - - - - - -	–	–	39·47	9·15	4·00	2·01	2·61	—
st London - - - - - -	192·65	90·32	90·22	63·47	14·73	3·67	—	—
uthwark, Lambeth, and Kent - -	2·77	7·32	6·67	1·69	1·34	–	2·28	3·34

Note.—The facts from which this Table was calculated are given on the following pages for each sub-district, arranged in the order of its evation, and grouped according to its water supply.

POPULATION and DEATHS from CHOLERA in the Ten Weeks ending 15th September, in the Sub-district of London, arranged according to their Elevation and Water Supply.

WATER COMPANY.	SUB-DISTRICT.	Elevation in Feet above Trinity High-water Mark.	Enumerated Population.		Deaths from Choler in the 10 Weeks ending 15th Sept.
			1851.	1861.	
GRAND JUNCTION, WEST MIDDLESEX, AND CHELSEA COMPANIES:					
Chelsea	St. John, Westminster	2	34,295	37,483	8
		Under 3	34,295	37,483	8
West Middlesex and Grand Junction.	St. Peter, Hammersmith	4	4,467	5,415	6
Chelsea	St. Margaret, Westminster	4	31,314	30,730	3
West Middlesex and Wells	Fulham	6	11,886	15,539	5
West Middlesex and Grand Junction.	St. Paul, Hammersmith	8	13,293	19,104	7
		3—10	60,960	70,788	21
Chelsea	Chelsea, South	10	19,050	21,654	8
Ditto	Chelsea, North-west	12	17,669	19,899	2
West Middlesex and Chelsea	Brompton	12	14,870	18,198	3
Chelsea	Belgrave	12	40,034	55,113	12
Ditto	Chelsea, North-east	13	19,819	21,886	2
New River and Chelsea	Charing Cross	17	12,587	11,071	1
		10—20	124,029	147,821	28
West Middlesex	Kensington Town	28	29,183	51,910	8
		20—40	29,183	51,910	8
Grand Junction	St. James's-square	40	11,469	10,753	1
Ditto	May Fair	56	12,980	12,885	1
		40—60	24,449	23,638	2
Grand Junction	Hanover-square	64	20,216	19,773	—
Ditto	Golden-square	68	14,139	13,966	2
Grand Junction and West Middlesex.	Rectory, Marylebone	68	27,633	26,692	7
West Middlesex	Cavendish-square	73	14,687	15,090	1
New River and West Middlesex.	Tottenham-court	73	28,433	29,371	10
West Middlesex	All Souls, Marylebone	76	28,841	29,952	4
Grand Junction	St. John, Paddington	76	29,053	36,769	5
Grand Junction and West Middlesex.	St. Mary, Marylebone	79	22,814	22,493	1
		60—80	185,816	194,106	30
Grand Junction and West Middlesex.	St. Mary, Paddington	82	17,252	39,015	3
West Middlesex and Hampstead.	Regent's Park, Pancras	87	31,918	34,927	3
West Middlesex	Christchurch, Marylebone	92	33,895	34,913	6
Ditto	St. John, Marylebone	124	29,826	32,540	6
New River and West Middlesex.	Hampstead	350	11,986	19,106	2
		80 & upwards.	124,877	160,501	20

Population and Deaths from Cholera in the Ten Weeks ending 15th September, &c.—*continued*

WATER COMPANY.	SUB-DISTRICT.	Elevation in Feet above Trinity High-water Mark.	Enumerated Population.		Deaths from Cholera in the Ten Weeks ending 15th Sept.
			1851.	1861.	
NEW RIVER COMPANY:					
ew River and East London	Aldgate	19	10,694	9,971	38
		10—20	10,694	9,971	38
ew River	London, City, South-west	21	9,204	7,762	1
Ditto	London, City, South	21	11,461	8,570	4
Ditto	London, City, South-east	21	10,594	8,659	4
Ditto	West London, South	24	15,887	15,395	9
Ditto	West London, North	36	12,946	11,750	16
ew River and East London	St. Botolph, East London	36	23,824	20,990	37
Ditto	Holywell, Shoreditch	36	17,245	17,313	13
ew River	St. Clement Danes, Strand	36	15,467	15,207	8
		20—40	116,628	105,646	92
ew River	Saffron-hill	40	13,837	12,012	1
Ditto	St. Leonard, Shoreditch	41	19,449	19,188	13
Ditto	Finsbury	43	12,941	12,931	7
Ditto	Cripplegate	44	20,582	19,697	8
Ditto	London, City, North-west	44	11,847	9,020	1
Ditto	London, City, North-east	44	12,826	11,544	2
Ditto	St. James, Clerkenwell	44	21,529	19,152	8
Ditto	St. Mary-le-Strand	48	11,615	10,346	3
Ditto	St. Andrew, East, Holborn	50	13,971	12,947	1
Ditto	Gray's Inn-lane	52	26,523	27,808	5
ew River and Hampstead	Camden Town	52	21,115	23,266	5
w River	City-road	52	16,840	17,860	2
Ditto	Whitecross-street	52	13,657	14,778	3
Ditto	Hoxton New Town	52	23,505	26,516	20
Ditto	Hoxton Old Town	52	17,431	25,777	10
Ditto	Haggerstone, West	52	20,276	23,260	22
Ditto	West Hackney	55	18,732	24,265	16
		40—60	296,676	310,367	127
w River	Long-acre	60	12,053	11,618	1
Ditto	Somer's Town	60	35,641	39,099	10
Ditto	Old-street, St. Luke's	60	10,617	11,504	1
Ditto	St. Anne, Soho	64	17,335	17,426	2
Ditto	St. Giles, South	64	19,951	19,483	3
Ditto	Berwick-street	65	10,798	10,607	5
Ditto	St. George-the-Martyr, Holborn	66	18,813	19,903	3
Ditto	Amwell, Clerkenwell	68	15,720	17,250	2
Ditto	St. Giles, North	68	17,456	17,201	10
Ditto	St. George, Bloomsbury	71	16,807	17,392	2
Ditto	Stoke Newington	72	4,840	6,608	—
Ditto	Goswell-street	78	15,625	16,200	3
		60—80	195,656	204,291	42
ew River	Pentonville	84	11,904	13,079	3
Ditto	Islington, East	88	47,448	79,899	30
Ditto	Islington, West	100	47,881	75,442	30
ampstead	Kentish Town	110	23,326	44,317	8
		80 & upwards.	130,559	212,737	71

POPULATION and Deaths from Cholera in the Ten Weeks ending 15th September, &c.—*continued.*

WATER COMPANY.	SUB-DISTRICT.	Elevation in Feet above Trinity High-water Mark.	Enumerated Population.		Deaths from Choler in the Ten Weeks ending 15th Sept.
			1851.	1861.	
EAST LONDON COMPANY:					
East London - - -	St. John, St. George-in-the-East -	2	9,990	9,695	184
		Under 3	9,990	9,695	184
East London - - -	Poplar - - - - - - -	3	23,384	43,529	418
East London and New River -	Shadwell - - - - - - -	7	16,179	12,537	150
		3—10	44,563	56,066	568
East London - - -	Limehouse - - - - - -	10	22,782	27,161	261
Ditto - - - -	Bow - - - - - - -	12	18,778	35,667	405
Ditto - - - -	Ratcliffe - - - - - - -	18	15,212	16,874	186
		10—20	56,772	79,702	852
East London - - -	St. Mary, St. George-in-the-East -	26	18,067	18,181	134
Ditto - - - -	St. Paul, St. George-in-the-East -	27	20,319	21,015	104
Ditto - - - -	Mile End Old Town, East - -	28	27,020	39,317	299
Ditto - - - -	Goodmans Fields - - - -	28	12,069	11,166	60
Ditto - - - -	Whitechapel Church - - - -	32	7,818	8,062	68
Ditto - - - -	Mile End Old Town, West - -	32	29,582	33,747	188
East London and New River -	Whitechapel, North - - - -	36	12,530	12,122	43
East London - - -	Mile End New Town - - -	36	14,543	15,392	158
Ditto - - - -	Spitalfields - - - - -	36	15,336	15,700	166
East London and New River -	Artillery, Whitechapel - - -	36	6,769	6,557	22
East London - - -	Town, Bethnal Green - - -	36	20,941	21,486	156
Ditto - - - -	Church, Bethnal Green - - -	36	21,787	25,528	104
Ditto - - - -	Green, Bethnal Green - - -	36	23,555	31,789	252
		20—40	230,336	260,062	1,754
East London and New River -	Hackney - - - - - - -	44	20,850	31,481	37
East London - - -	South Hackney - - - - -	44	8,458	15,458	28
Ditto - - - -	Hackney-road - - - - - -	44	23,910	26,298	83
Ditto - - - -	Haggerstone, East - - - -	52	11,351	17,310	10
		40—60	64,569	90,547	158
East London - - -	Stamford Hill - - - - - -	76	5,549	5,483	2
		60—80	5,549	5,483	2
SOUTHWARK, LAMBETH, AND KENT COMPANIES:					
Lambeth and Southwark -	St. George, Camberwell - - -	−3	15,849	20,333	9
Southwark and Lambeth -	St. Peter, Walworth - - - -	−2	29,861	44,463	5
Lambeth and Southwark -	St. Mary, Newington - - -	−1	14,033	15,082	1
Southwark and Lambeth -	Trinity, Newington - - - -	−1	20,922	22,675	2
Ditto - - - - -	Kent-road - - - - - -	−1	18,126	19,652	1
Southwark - - - - -	St. James, Bermondsey - - -	−1	18,899	25,154	18
Ditto - - - - -	St. Mary Magdalen, Bermondsey -	–	13,934	16,505	2
Southwark and Lambeth -	Leather Market - - - - -	–	15,295	16,696	2
Lambeth and Southwark -	London-road - - - - - -	–	17,836	19,190	9
Kent - - - - - -	Rotherhithe - - - - - -	–	17,805	24,502	17
Lambeth and Southwark -	Lambeth Church, 2nd Part - -	1	26,784	29,542	15
Ditto - - - - -	Lambeth Church, 1st Part - - -	2	18,409	19,839	6
Ditto - - - - -	Waterloo road, 2nd Part - - -	2	18,348	18,640	2
Ditto - - - - -	Christchurch, Southwark - - -	2	16,022	17,069	5
Southwark and Lambeth -	Borough-road - - - - - -	2	15,862	16,668	5
Southwark - - - - -	St. John, Horsleydown - - -	2	11,360	11,393	2
		Under 3	289,345	337,403	101

POPULATION and Deaths from Cholera in the Ten Weeks ending 15th September, &c.—*continued.*

VATER COMPANY.	SUB-DISTRICT.	Elevation in Feet above Trinity High-water Mark.	Enumerated Population. 1851.	Enumerated Population. 1861.	Deaths from Cholera in the Ten Weeks ending 15th Sept.
SOUTHWARK, LAMBETH, AND KENT COMPANIES—*continued.*					
beth and Southwark	Waterloo-road, 1st Part	3	14,088	15,269	3
hwark and Lambeth	Battersea	3	10,560	19,600	18
hwark	St. Saviour, Southwark	4	19,709	19,101	19
hwark and Lambeth	Kennington, 1st Part	4	24,261	30,785	11
hwark, Lambeth, Kent, and ells.	Peckham	4	19,444	28,135	18
t	St. Nicholas, Deptford	4	7,071	8,139	45
hwark and Lambeth	Camberwell	5	17,742	21,297	9
hwark	St. Olave, Southwark	6	8,015	7,663	5
t	Greenwich, East	7	16,228	18,306	21
hwark and Lambeth	Kennington, 2nd Part	8	18,848	20,440	3
		3—10	155,966	188,735	152
; and Southwark	St. Paul, Deptford	10	24,899	37,834	24
;	Greenwich, West	12	18,800	21,696	33
hwark and Wells	Wandsworth	12	9,611	13,346	7
itto	Putney	12	5,280	6,481	1
s	Lewisham Village	16	6,097	7,372	2
		10—20	64,687	86,729	67
hwark and Wells	Clapham	21	16,290	20,894	4
		20—40	16,290	20,894	4
;	Lee	44	8,478	11,807	—
beth and Southwark	Brixton	56	14,610	20,067	5
		40—60	23,088	31,874	5
s	Dulwich	68	1,632	1,723	—
beth and Wells	Streatham	72	9,023	10,082	—
		60—80	10,655	11,805	—
beth and Wells	Norwood	128?	3,977	7,462	1
beth	Sydenham	188?	4,501	10,595	5
		80 and upwards.	8,478	18,057	6
and Wells	Eltham	?	2,568	3,009	—
	Plumstead	?	13,191	32,974	6
tto	Woolwich Dockyard	?	17,140	22,919	14
tto	Woolwich Arsenal	?	15,227	18,776	13
		Elevation not stated.	48,126	77,678	33

Week ending Saturday, 6th October.

The deaths registered in London during the week were 1,344. It was the fortieth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,235. The deaths in the present return exceed the estimated amount by 109.

One hundred and eighty-two deaths from cholera, and 69 from diarrhœa, were registered during the week. 16 deaths from cholera and 8 from diarrhœa occurred in the West; 37 from cholera and 8 from diarrhœa in the North; 31 from cholera and 18 from diarrhœa in the Central; 50 from cholera and 17 from diarrhœa in the East; and 48 from cholera and 18 from diarrhœa in the South districts.

Eighty-six young persons under 20 years of age died from cholera and 49 from diarrhœa; at the age of 20 years and upwards 96 deaths occurred from cholera and 20 from diarrhœa.

Week ending Saturday, 13th October.

The deaths registered in London during the week were 1,353. It was the forty-first week of this year; and the average number of deaths for that week is, with a correction for increase of population, 1,222. The actual number exceeds the estimated number by 131.

Zymotic diseases proved fatal to 459 persons, the corrected average being 348. There were 24 deaths from small-pox, 21 from measles, 36 from scarlatina, 5 from diphtheria, 27 from whooping-cough, and 47 from diarrhœa.

Two hundred and seven deaths from cholera, and 47 from diarrhœa, making 254 deaths from the two forms, were registered during the week; 38 in the West districts, 41 in the North, 44 in the Central, 82 in the East, and 49 in the South districts. The mortality is lowest, taking population into account, in the South and North, highest in the Central and in the East districts. Many of the deaths occur in the various hospitals. The places in which the patients were attacked are printed in the notes when registered, with the particulars of each death, either by cholera or by diarrhœa.

The mortality of epidemic cholera and diarrhœa has only yet attained high proportions in the East London water field from known causes; and in the last six weeks the deaths all over London have been 289, 292, 248, 244, 251, 254. In the epidemic of the year 1854, the deaths by cholera and diarrhœa in the corresponding weeks were 2,326, 1,781, 1474, 919, 509, and 351. The deaths since the first week in September 1866 have been 1,578; in the corresponding six weeks of 1854, the deaths from cholera and diarrhœa were 7,360. At the cholera rates of 1854, the deaths in the last six weeks, corrected for increase of population, would have been 8,929; the deaths have been 1,578. Here are 7,351 lives saved.

This is encouraging. Incessant attention should be given to the disinfection of the sewage of towns on the Thames and the Lea above the intake of the London water companies; and it would be exceedingly satisfactory to learn that the engineers see some way, such as Dr. Frankland suggested, to the effectual filtration of the London waters.

To facilitate the extirpation of cholera the Daily Return of Deaths will be continued, and if the health officers will report what proceedings are taken in each case, the weekly summary will show the vigilance of the local authorities, and the use they make of the information placed at their disposal.

Experience proves that destruction of the cholera poison is rarely ever effected in bad districts unless it is carried out under the eyes of medical visitors; and in the same way premonitory diarrhœa is neglected. The danger of the whole metropolis is thus indefinitely protracted.

Week ending Saturday, 20th October.

The deaths registered in London during the week were 1,464. It was the forty-second week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,227. The present return exhibits an excess of 237 deaths above the computed number. The increase of the total deaths is partly due to bronchitis.

One hundred and forty-four deaths were registered from cholera, and 55 from diarrhœa, making 199 in the aggregate. The deaths from cholera and diarrhœa in the last six weeks were 292, 248, 244, 251, 254, 199.

The health of London depends very much upon the inflow of pure water, and the outflow of impure sewage. The nine water companies have, according to their returns, supplied 100,864,971 gallons daily on an average in the London area during the month of September.

South London received from its three water companies 30,186,829 gallons daily during the month; and Mr. Bazalgette has, upon being applied to, supplied a return of the sewage discharged daily in September at the southern outfall works, Crossness; it amounted to 46,229,675 gallons, including the yield of the streams of land drainage, which necessarily varies from week to week. The sewage discharged daily was 43,976,300, 37,443,771, and 43,319,041 gallons in the three weeks ending October 20th.

If, instead of gallon, the more convenient cubic metre of French engineers, or metric ton, agreeing

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agreeing closely with our ton weight, is substituted, we have these results.* London was supplied with 458,276 metric tons of water daily during September, or at the rate of 318 tons per minute, 5⅓ metric tons per second. On the south side the water supply was 95 metric tons, the sewage discharged at Crossness 149 metric tons per minute.

The northern outfall sewer does not yet carry down to Barking Creek the sewage of the low level region north of the Thames; and Mr. Bazalgette fears that "it will be quite a year and a half before we shall get the whole of the northern sewage discharged through the outfall sewer, because parts of the low level have to be constructed in the line of the proposed Chelsea embankment of the Metropolitan Railway." Such is the present state of the London sewage.

The quality of the water supply in September has been tested as usual by Dr. Frankland. He gives a remarkable instance of the effects of filtration through animal charcoal of the East London company's water, supplied to the tenants of Miss Coutts, in Columbia-square. The organic matter was reduced to the minutest quantity; the hardness from 20° to 70°. The filtration of the water supply for 700 people is here performed without the least difficulty.

The medical health officers of London have been requested to favour the Registrar General with a weekly return of what is done in their respective districts for extinguishing epidemic cholera. Dr. Ballard has fully described the measures which are employed in Islington. It is by scrupulous attention to such details, and by purifying the water, that this plague can be stayed.

(The replies of the Health Officers are given in the Appendix).

Week ending Saturday 27th October.

The deaths registered in London during the week were 1,394. It was the forty-third week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,271. The present return exhibits an excess of 123 deaths above the computed number. The excess is partly due to affections of the air passages (bronchitis).

One hundred and twelve deaths from cholera and 32 deaths from diarrhœa were registered. The deaths from both forms in the last six weeks were 248, 244, 251, 254, 199, and 144.

Of the 112 deaths last week from cholera, no less than 30 extremely malignant cases occurred in the Woolwich Dockyard and the Plumstead and Charlton sub-districts, near the southern outfall sewer. The Plumstead cases occurred in the marsh district where many low houses are environed by tidal ditches.

The Medical Officers of Health have given an interesting account of the hygienic measures now in operation, showing an amount of vigilance and efficiency in some districts for which the local authorities and their excellent health officers have not obtained due credit (see pages 765–69 aad 786–94). The evidence of activity in other districts is by no means equally conclusive.

The health officers of Bristol and Birkenhead, as well as of London, bear ample testimony to the utility of the disinfection of the cholera dejections by chemical agents. This can only be done effectively and kindly under medical supervision. It is a difficult chemical experiment to be performed by a practised operator. To place carbolic acid, or chloride of zinc, or permanganate of potash, in the hands of people who have never seen these substances, know none of their properties, and have just been terrified by the sudden loss of a father, a mother, or a child, is to do nothing. The poor people cannot be expected to know how a house is to be disinfected, and still less to perform the operation.

The decline of cholera can be accelerated, but to ensure success every part of London must do its duty; and should expense in the poor districts stand in the way, the Metropolis will no doubt be as willing to pay a cholera rate as all England was to pay a cattle rate to meet an emergency.

Week ending Saturday 3rd November.

The deaths registered in London during the week were 1,432. It was the forty-fourth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,316. The actual return exhibits an excess of 116 over the estimated return. Bronchitis and pneumonia have been unusually fatal.

Seventy-three deaths from cholera, 28 from diarrhœa, 101 from both forms of disease were registered. The deaths from cholera and diarrhœa in the last six weeks were 244, 251, 254, 199, 144, and 101. Of the 73 deaths from cholera, no less than 28 occurred in the two sub-districts of Woolwich Dockyard and Plumstead. The bad hygienic condition of the people is discussed in papers by Dr. Finch, Mr. Ruegg, and Mr. Grant, the assistant engineer of the Metropolitan Board.

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* A cubic metre of pure water weighs a metric ton = 1,000 litres = 22·1 gallons = 2,201 lbs. avoirdupois, while the common ton is 2,240 lbs.

The disinfection of houses in which deaths by cholera have been registered is still proceeding, and if the operation is performed with skill, care, and efficiency, the decline of the epidemic will go on at a still more rapid pace.

Professors of chemistry sometimes fail in their comparatively simple experiments; how much more likely is disinfection to fail in the hands of ignorant people. It should be performed by officers properly instructed, under medical supervision. Inefficient disinfection is a delusion and a snare.

The medical health officers of Bristol, Birkenhead, Liverpool, and Leeds have given an account of the hygienic measures adopted, it is gratifying to add, in these cases with signal success.

Week ending Saturday, 10*th November.*

The deaths registered in London during the week were 1,361; it was the forty-fifth week of the year, and the average number of deaths for that week is, with a correction for increase of population, 1,378. The deaths in the present return are less by 17 than the estimated number.

Sixty-seven deaths from cholera, and 33 deaths from diarrhœa were registered in the week. The deaths from the two forms of disease in the last five weeks were 254, 199, 144, 101, and 100. Seven deaths from cholera occurred last week in Whitechapel, and 13 in Greenwich, Deptford, and Woolwich.

A large number of the deaths from cholera have latterly occurred in Woolwich, and the outbreak is described in the Appendix.

In reference to the statement that cases of cholera had occurred in Charlton without any premonitory diarrhœa, Dr. Macloughlin has addressed a letter to the Registrar General upholding the doctrine which he advocated so forcibly in 1854, to the effect that cholera is invariably preceded by premonitory diarrhœa. Great credit is due to him for the labour which he bestowed in inquiring into the cases of 1853, and contributing to establish the doctrine now prevalent.

Eruption of Cholera in Woolwich.

When cholera was declining in London, Woolwich showed signs of a parting outbreak in September,[*] and in the last three weeks 73 persons were suddenly killed in the town and its suburbs. The area is very narrow on which these people died, and the circumstances are peculiar.

Woolwich is one of the principal military stations of England. There is a large force of the artillery and of marines, and there is the garrison hospital, amounting, with cadets, in the aggregate, in 1861, to more than 5,000 men.[†] The dockyard employs many men, the great arsenal of the empire is full of artisans in Government employ. The health of the place in time of war might be of vital importance, yet several of the sanitary arrangements are singularly unsatisfactory.

Woolwich extends from the south banks of the Thames below high-water mark up the side of a hill, and has Plumstead on its east, Charlton on its west flank. Nearly all the deaths have occurred scattered over the Woolwich Dockyard sub-district, and in the marsh region of Charlton, which with Plumstead constitutes the sub-district of that name. Few deaths occurred in the parish of Plumstead. Nearly every house in the afflicted district has the water of the Kent Company laid on by stand-pipe for a short time every day, and the people often having no butts of any kind collect the supply as they best can, in vessels of various kinds, dirty or clean, as the case may be. The only resource when the water supply proves insufficient is an underground tank of rain water close to the cesspool. The waterclosets have no water laid on, the water having, it is said, in many cases been cut off because the landlords or the tenants have at some time or other neglected to pay the rate, for the landlords of much of the house property appear to entertain insuperable objections to expending anything on their property, so the tenants suffer for the landlords' as well as for their own defaults. The offices of the dwellings are in a dirty dilapidated condition.

Dr. Finch has described the outbreak in Charlton (*see* pp. 813, 814).

Mr. Grant, C.E., Engineer of the Metropolitan Board, has given a graphic description of the block of 300 small houses, on the marsh, about six feet below high-water mark, traversed here by the southern outfall sewer (*see* pp. 814, 815).

In descending the green hills of Charlton, between mounds and fine spreading trees, in the sunshine, the land around looks the healthiest that can be imagined. The ships floating in the full flood of the Thames remind you that you are near the wealthiest commercial emporium of the world.

At the bottom of the hill is one of the massive engines of the Kent Water Company, pumping its daily supply of water from the chalk well on the margin of the marsh, not far from the tidal ditch below, but inaccessible, it may be assumed, to the ditch waters. A middle-aged man coming out of one of the cottages in the row looks sad; his wife is ill, and a young lodger has just died of cholera. Crossing the railway and the turnpike-gate to the right three streets of small houses are seen stretching between the lower Woolwich road and the Thames. These houses are full of artisans of all kinds and their families, with some labourers and gardeners. In front of a few houses on the left of West-street, where six or seven deaths have been registered, a crowd is collected; a man and woman are quarrelling, and the language usual on such occasions is freely interchanged; the woman marching about with a child in her bare arms, and threatening to have "the law on the slanderous ruffian;" the man reminding her that a dead child has just been carried from the house. The man is a drunkard, and disturbs his neighbours, who are nearly all respectable artisans. A few doors on is a decent woman in a clean house, whose son, a young gardener, was attacked by cholera in the morning, at six o'clock, and died before noon; his two boys were running about, and the mother was from home. This row of houses is on the marsh, and the water soaking from the tidal ditch is seen through the floor; the recent heavy rains have flooded the land. The market gardens towards Greenwich had been covered with the foulest manure for a week before the great outbreak; the ground was opened, and 68 deep wide cesspools were emptied, which diffused offensive poisons all around. The works were nearly completed on 3rd November, and the mortality declined. The people of East-street and West-street, and Harden's Manorway were ill in great numbers, and several had died within a few days; some of the artisans were sick at home; the wives and children had all been ailing. Sudden deaths by cholera create inconceivable consternation, and the women, often intelligent, complained that they did not know where to get the medicines liberally offered for nothing by the Board. Some of the men earn good wages. A few of the houses in Woolwich, where the greatest number of deaths occurred from cholera, were deserted, and no information could be obtained. The people in Charlton, on the marsh, often, as Mr. Grant says, two families in a house, worked in the gardens, or in the dockyard or the arsenal; they did not know what to do; they had heard that their houses had been condemned, and had on one hand the terror of cholera, on the other the dread of being driven away.

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[*] *See* Weekly Tables for weeks ending 1st and 8th September, where the Woolwich authorities were warned.

[†] *See* Census, vol. i., p. 219.

These houses were built, it appears, by speculating builders, on land entirely unfit for sites, but dwellings for workmen are indispensable, and although there is land in abundance in the neighbourhood on which healthy dwellings for the artisans of Woolwich might be erected, it is not clear that it is available without the intervention of the Legislature, as much called for in such cases as in the case of railways.

The question of the sites of dwellings for the working classes is one of the most pressing, and will no doubt obtain the attention of Her Majesty's Government.

In the meantime by erecting healthy dwellings on suitable sites, and letting them to their workmen at adequate rents, the Government establishments might set an excellent example which other employers would probably in the end imitate. The abject straits to which married men, sometimes earning good wages in the works, are now put in Woolwich and Charlton, have been brought to light by the cholera, and it is not likely that the lesson will be altogether thrown away. The great outfall sewer has probably had little effect on the outbreak of cholera, but it is by no means clear that the contamination of the Thames by sewage will have no effect on the health of the people in the marshes. This must be looked to by the able engineers of the Metropolitan Board.

Week ending Saturday, 17 November.

The deaths registered in London during the week were 1,428; it was the 46th week of the year, and the average number of deaths for that week is, with a correction for increase of population, 1,519. The deaths in the present return are less by 91 than the estimated number; thus the mortality has been below the average for two weeks in succession.

The eruption of cholera in October, partly due to the sanitary defects of Woolwich and Lower Charlton, is subsiding, and the small houses of Lower Charlton are now supplied with a system of drains.

Thirty-two persons died of cholera, 22 of diarrhœa in the week. The decline of the disease is decisive, and with due vigilance in London it will ere long be extinguished in the epidemic form. The deaths from cholera in the last five weeks were 144, 112, 73, 67, and 32, among more than three millions of people.

Dr. Frankland has investigated some of the physical properties of cholera stuff (cholrine); he has shown that it passes through filtering paper, and that water containing $\frac{1}{500}$th part of the matter is not entirely purified by transmission through animal charcoal. Whether the properties of the remaining molecules or organisms undergo any change in the filtering process, depriving them of their zymotic character, has not been determined. The investigation proves the importance of destroying all the dejections by disinfectants, and of drawing water from sources free from contamination.

The Registrar General has received the following communication from Professor Frankland, F.R.S., of the Royal College of Chemistry:—

10th November 1866.

On the 27th ult. I received from Dr. Farr three bottles containing the rice-water evacuations of a cholera patient collected on the previous day.* After agitation the rice-water had the appearance of thin cream, from which a small amount of flocculent matter gradually subsided after the lapse of some hours, leaving a supernatant liquid looking exactly like milk, and from which no further perceptible subsidence took place even after the lapse of several days.

One

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* The cholera matter was supplied by Dr. Sutton, pathologist to the London Hospital.

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One volume of this choleraic evacuation was mixed with 10 parts of distilled water, and sealed up in a long glass tube; the flocculent matter now subsided much more readily, leaving an opalescent liquid above. One volume of the rice-water was mixed with 100 volumes of distilled water, and sealed up in a similar glass tube. The flocculent precipitate now subsided still more readily.

One volume of the rice-water was mixed with 500 volumes of distilled water, and the mixture passed through filter paper. The filtered liquid was still very opalescent, proving that a process of filtration, far more perfect than any available for the filtration of water upon a large scale, fails to remove entirely the suspended matter of choleraic evacuations.

Submitted to the action of potassic permanganate, 100,000 parts of the filtered liquid just mentioned required ·0430 part of oxygen for the oxidation of the organic matter contained in it. The average amount of oxygen required to oxidise the organic matter contained in 100,000 parts of filtered Thames water as supplied to the Metropolis is ·0724 part. Thus a sample of water containing $\frac{1}{500}$th of its volume of choleraic evacuation exhibits, when tested by potassic permanganate, a much greater degree of purity as regards organic matter than the water supplied to the inhabitants of the Metropolis; in fact it may be safely asserted that the addition of cholera rice-water to the water of the Thames in the proportion of 1 to 1,000 would not materially affect the results of a chemical analysis of the water.

After rapidly passing the above filtered but opalescent liquid (containing $\frac{1}{500}$th of choleraic evacuation) through animal charcoal the opalescence was diminished but not entirely removed. The organic matter still remaining in 100,000 parts of it now required only ·0103 part of oxygen for its oxidation. Animal charcoal therefore fails to remove entirely, even from previously filtered water, the suspended matter of choleraic evacuations.

The foregoing experiments show first that water may become seriously contaminated with choleraic matter without the presence of the latter being indicated by chemical analysis, and, secondly, that water so contaminated is not completely deprived of this impurity either by filtration or passage through animal charcoal.

It still remains to be proved to what particular constituent of choleraic dejections, the propagation of the disease is due, but it is obvious that if the propagating matter be a germ or an organism, it must be in suspension and not in solution.

I have, &c.
E. Frankland.

The following notes by Dr. Sutton describe the course of the disease in the patient from whom the stuff was taken. It was a well-marked and severe case of cholera:—

James F., aged 10 years, admitted October 14th, 4 P.M., into the Cholera Hospital, Commercial-street.

October 14th.—On admission: face pale, skin cold, pupils dilated, pulseless, vomited just after admission.

5 P.M. to 7·30 P.M. Vomited five times fluid like rice-water, and purged twice. Evacuations, rice-water.

7·30 P.M. Face, lips, and tongue cold. Eyes seem closed; very restless; turns himself from side to side; respiration normal; temperature in the axilla 93° Fahrenheit (in collapse).

During the night purged once; rice-water evacuations; extremities cold; hands cold and shrivelled; body feels clammy, and is livid; eyes seem closed.

October 15th. From 6 A.M. until 10·15 A.M., hot; purged and vomited once; fluid like rice-water; pulseless at the wrist, and in the bracheal artery. He died at 10·15 A.M. on October 15th, 1866.

Week ending Saturday, 24 *November.*

The deaths registered in London during the week were 1,435. It was the forty-seventh week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,608. The deaths in the present return are less by 173 than the estimated number.

Eight deaths from cholera, 26 from diarrhœa, were registered during the week. For the first time since the origin of the epidemic the number of deaths by cholera is less than the number of deaths by diarrhœa. The deaths by cholera during the last seven weeks were 207, 144, 112, 73, 67, 32, and 8; while the weekly deaths by diarrhœa fell from 47 to 26 in the same time.

It must be allowed that the circumscription of the most dangerous epidemic of the year in London is very much due to the measures by which it has been combated; and the time has now come for the extension of similar measures to the extinction of other zymotic diseases, such as typhoid fever.

The Companies supplied each house with a metric ton of water daily in October. Dr. Franklin's analysis of the waters for November are given in the Appendix.

Dr. Letheby, in the Appendix, has described the array of disinfectants which have been employed under his instructions in the city; and has laid down rules for their use at once clear, judicious, and practical.

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In reply to an inquiry, Dr. Franklin makes the following observations on the effect of temperature on organic matter in water:—

With regard to the temperature at which the putrefaction and decay of organic matter in water takes place, I find that the following is all that appears in the printed report of my evidence on the subject in the case "Duke of Buccleuch and others *v.* Alexander Cowan and others," recently tried at Edinburgh. "Where a river becomes sluggish—as where it is pent up by a weir—the quantity of organic matter, and also of mineral matter, increases in some cases very considerably; but that is only the case in warm weather, and the temperature of the water must be 55° Fahrenheit and upwards for this effect to be produced. The putrefaction of the mud in the bed of the river ensues, and the previously insoluble matter becomes soluble matter."

The safest and most sensitive test of putrefaction in water is the relative proportion of oxygen to nitrogen in the dissolved gases. The river North Esk, as it flowed through the Duke of Buccleuch's grounds at Dalkeith Palace in March and in June last, afforded striking evidence of this kind as to the effect of temperature upon the absorption of oxygen by the organic matter of water (it is only when the whole of the oxygen dissolved in the water is consumed, that the latter assumes a true and offensive putrefactive condition). On the 3rd of March the temperature of the water in the North Esk was 38° Fahrenheit, and the proportion of oxygen to nitrogen in the dissolved gases was $O:N=1:2·02$. This is the normal proportion in water free from organic matter. On the 21st of June the river emitted a putrid odour, the temperature of the water was 60° Fahrenheit, and the proportion of oxygen to nitrogen was $O:N=1:25$; thus the amount of dissolved oxygen was reduced to a mere trace, and the organic matter was in a putrescent condition.

Week ending Saturday, 1 December.

The deaths registered in London during the week were 1,459. It was the forty-eighth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,596. The deaths in the present return are less by 137 than the estimated number.

Three* deaths from cholera were registered during the week; and the epidemic is now virtually extinct. The 15 deaths from diarrhœa are below the average number of previous years.

The total deaths from cholera in the present epidemic have been 5,548, exclusive of 2,692 deaths from diarrhœa, due in part to the cholera element. In the year 1849, when the population of London was about two millions and a quarter, cholera slew 14,137 people of all ages; in 1854 not less than 10,738 out of two millions and a half; and in the present year, when the population exceeds three millions, the deaths have been 5,548, of which 3,909 occurred in the East London districts, and 1,639 in the rest of the metropolis.

The deaths to every 10,000 of population were 62, 43, and 18 in the three epidemics all over London. In the present epidemic the West Districts lost 4, the North Districts 6, the South Districts 8, the Central Districts 9; and it was only in the East Districts where the ravages recalled the violence of former epidemics, that 3,909 people, that is 64 in every 10,000 of the unhappy inhabitants, perished.

Holland and Belgium have published returns down to a recent date, for which the Registrar General is indebted to M. de Baumhauer and M. Heuschling, and the facts prove that the epidemic is as fatal as it ever was under unfavourable sanitary conditions. Thus in 22 cities and towns of Belgium and Holland containing less than half the population of London, or 1,460,808 people, the deaths from cholera alone in the present year were 20,643. So the deaths were 141 in 10,000, and if the same proportion of inhabitants had perished in London the deaths, instead of five, would have exceeded forty-two thousand. In Brussels the deaths were in the proportion of 164, Utrecht 271, Amsterdam 42, in 10,000 inhabitants.

By the bulletin published monthly by the Prefect of the Seine, it appears that the deaths from cholera in Paris were 6,653 in 1865, that is in the proportion of 39 to 10,000 inhabitants; while by the second outbreak in the present year 1,812 persons had died by the end of July, the date of the last return, when the epidemic was increasing rapidly.

In London cholera has not only been less fatal than it was in previous epidemics, but its fatality has been reduced almost to insignificance in several of the districts by the mere force of hygienic science, before which the destroyer has retreated step by step; never, however, losing an opportunity of asserting its full power wherever negligence or ignorance presented an opening, either in England or in the cities of the continent of Europe.

Cholera obeys certain laws, and the knowledge of those laws renders its subjugation in Europe practicable, provided all the people as well as the governments will co-operate in the work. This it may be hoped will be done, and it only remains for the metropolis of this empire to hold its own, and to keep the lead.

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* Two of these deaths were not published in the daily returns.

ESTIMATED POPULATION in 1849, 1854, and 1866; Number of DEATHS registered from CHOLERA a
DIARRHŒA in 1849, 1854, and 1866, and the Proportional Number of Deaths from Cholera and Diarrh
in the same Periods, to 10,000 Persons Living, in each of the Five Groups of London Districts.

—	1849.						
	Estimated Population.	Deaths Registered in 52 Weeks.			Proportional Number of Deaths to 10,000 Persons Living.		
		Cholera.	Diarrhœa.	Cholera and Diarrhœa.	Cholera.	Diarrhœa.	Cholera Diarrh
LONDON - - - - -	2,286,635	14,137	3,899	18,036	61·8	17·1	78·
West Districts - - - - -	362,278	1,223	486	1,709	33·8	13·4	47·
North Districts - - - - -	469,011	956	675	1,631	20·4	14·4	34·
Central Districts - - - - -	391,946	1,724	550	2,274	44·0	14·0	58·
East Districts - - - - -	469,159	3,097	882	3,979	66·0	18·8	84·
South Districts - - - - -	594,241	7,137	1,306	8,443	120·1	22·0	142·

—	1854.						
	Estimated Population.	Deaths Registered in 52 Weeks.			Proportional Number of Deaths to 10,000 Persons Living.		
		Cholera.	Diarrhœa.	Cholera and Diarrhœa.	Cholera.	Diarrhœa.	Cholera Diarrh
LONDON - - - - -	2,504,300	10,738	3,147	13,885	42·9	12·6	55·
West Districts - - - - -	403,714	2,051	439	2,490	50·8	10·9	61·
North Districts - - - - -	531,002	779	508	1,287	14·7	9·6	24·
Central Districts - - - - -	392,065	644	397	1,041	16·4	10·1	26·
East Districts - - - - -	514,860	1,509	683	2,192	29·3	13·3	42·
South Districts - - - - -	662,659	5,755	1,120	6,875	86·8	16·9	103·

—	1866.						
	Estimated Population.	Deaths Registered in 23 Weeks.			Proportional Number of Death to 10,000 Persons Living.		
		Cholera.	Diarrhœa.	Cholera and Diarrhœa.	Cholera.	Diarrhœa.	Cholera Diarrh
LONDON - - - - -	3,037,991	5,548	2,692	8,240	18·3	8·9	27·
West Districts - - - - -	511,258	185	366	551	3·6	7·2	10·
North Districts - - - - -	686,021	419	548	967	6·1	8·0	14·
Central Districts - - - - -	359,219	329	364	693	9·2	10·1	19·
East Districts - - - - -	607,945	3,909	825	4,734	64·3	13·6	77·
South Districts - - - - -	873,548	706	589	1,295	8·1	6·7	14·

PROPORTION of DEATHS by CHOLERA to Population in European Cities.

CITIES.	EPIDEMIC PERIOD.	Population.	Deaths from Cholera.	Deaths to 10,000 Living.
ondon	23 weeks, 1866	3,037,991	5,548	(a) 18·3
aris	12 months, 1865 7 months, 1866	1,696,141	6,653 1,812	39·2 (b) 10·7
aples	1865	446,931	2,301	51·5
ienna	11th August to 10th November 1866	560,000	2,875	51·3
verpool	20 weeks ending 24th November 1866	484,337	1,754	36·2
fteen Dutch Cities and Towns (including Amsterdam).	June to October 1866	826,464	8,872	107·3
msterdam	June to October 1866	262,691	1,104	42·0
ven Belgian Towns (including Brussels).	1st May to 15th October 1866	634,344	11,771	185·6
russels	1st May to 15th October 1866	184,932	3,028	163·7

Week ending Saturday, 8 *December.*

The deaths registered in London during the week were 1,584. It was the forty-ninth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,525. The deaths in the present return exceed the estimated number by 59. The excess is amply accounted for by bronchitis, a disease of cold weather.

Only one death from cholera was registered in the seven days; it was the death of a labourer's child, aged 2½ years, at 37, Church-street, Poplar. The deaths from cholera in the last five weeks have been 67, 32, 8, 3, and 1.

The supplement gives definitively the deaths by cholera in each district to every 10,000 inhabitants, and the results may be thus briefly summed up; in St. George, Hanover-square, 2 in 10,000 died of cholera; Chelsea, 4; Westminster, 6; Marylebone, 3; Kensington, 4; all on the north side of the Thames, and supplied with water by the Grand Junction, the Chelsea, and the West Middlesex Companies.

The following districts on the south side of the river were supplied by the Southwark and by the Lambeth Companies, and the deaths by cholera to 10,000 inhabitants were in Newington, 3; St. George, Southwark, 7; Wandsworth, 5; Camberwell, 6; Rotherhithe, 9; Lambeth, 7; St. Olave, 9; Bermondsey, 6; St. Saviour, 7.

The New River taking about 82 per cent. of its water from the River Lea supplies St. Martin-in-the-Fields, where the deaths were four by cholera in 10,0000 inhabitants; in the City of London, 5; West London, a part of the City without the Walls, 12; Strand, 7; Islington, 4; Holborn, 6; St. Luke, 16; St. Giles, 10; Clerkenwell, 11. In Pancras, chiefly supplied by the New River, the deaths were 6; St. James, Westminster, 4; Hampstead, 1.

The East London Company draws all its water from the River Lea, but it has pumps at two different stations, the one at Lea Bridge, and the other two miles below, at Old Ford, where it has a small covered reservoir, and two open reservoirs in "dangerous proximity" to the Lea, at a point where that tidal river is full of foul sewage; the deaths here were at a very different rate; namely, 63 in Bethnal Green, 65 in Mile End Old Town, 93 in St. George-in-the-East, 85 in Poplar, 78 in Whitechapel, 111 in Stepney. There are two sub-districts on the east side of the Lea, also supplied by the East London Company, and the deaths were at the same rate as on the west side.

In three districts supplied partly by the New River, and partly by the East London Company, the deaths were in intermediate proportions; namely, 13 in Shoreditch, 12 in Hackney, 16 in East London districts, which is a part of the City of London without the walls.

The reasons for believing that the choleraic water was only distributed by the East London Company up to a certain date were stated at the time; and probably that Company will now be willing to relate all the circumstances of that deplorable and fatal accident.

In Lewisham, including Plumstead and Charlton, the deaths by cholera were 6 in 10,000 inhabitants, in Greenwich, Deptford, and Woolwich, 20; both these districts are supplied by the Kent Company in conjunction with the Lambeth and the Southwark Companies.

A most gratifying and conclusive proof of the good effects of improved water supply is afforded by the experience of the South London Districts, which were undrained and were supplied with the foul sewage water of the Thames by the Southwark and Lambeth Companies in 1849. The Lambeth Company got purer water from the Thames above Teddington Lock before 1854, but the Southwark Company only succeeded in supplying the purer

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(a) Epidemic ended. (b) Epidemic going on.

Appendix, No. 8.

purer water after the year 1854. In the present year both Companies have supplied this better, if not perfectly pure water, of the Thames; while the shallow pumps have been dried up by the drains,—with the following remarkable results:—The deaths by cholera to 10,000 inhabitants of South London were 120 in the year 1849, 87 in 1854, and 8 in the year 1866. From cholera and diarrhœa, the deaths out of the same numbers living were 142, and 104, and 15! As the water improved the deaths declined to this marvellous extent. Similar, if less striking evidence of the effects of pure and impure waters is supplied by the experience of the other London Companies.*

The annual rate of mortality last week was 27 per 1,000 in London, 29 in Edinburgh, and 29 in Dublin; 26 in Bristol, 25 in Birmingham, 31 in Liverpool, 29 in Manchester, 27 in Salford, 29 in Sheffield, 36 in Leeds, 30 in Hull, 35 in Newcastle-upon-Tyne, and 32 in Glasgow. The rate in Vienna was 27 per 1,000 during the week ending the 24th ult., when the temperature was 5·2° Fahrenheit lower than in the same week in London, where the rate was 24 per 1,000.

NUMBER of DEATHS Registered in London from CHOLERA and DIARRHŒA in corresponding Weeks of 1849, 1854, and 1866.

CHOLERA.

Number of Week -	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
1849 - - -	June 3 - 9	22	42	49	124	152	339	678	783	926	823	1,230	1,272	1,663	2,026	1,682
1854 - - -	June 3 - 2	1	1	1	–	1	5	26	133	399	644	729	847	1,287	2,050	1,549
1866 - - -	June 2 - 2	3	3	1	6	14	32	346	904	1,053	781	455	265	198	157	182

Number of Week -	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1849 - - -	839	434	288	110	41	25	11	6	8	2	1	–	1	1	–
1854 - - -	1,284	754	411	249	163	66	31	23	12	8	7	5	2	3	2
1866 - - -	150	177	182	207	144	112	73	67	32	8	3	1	–	–	–

DIARRHŒA.

Number of Week -	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
1849 - - -	June 3 - 16	20	36	17	30	46	89	131	224	179	173	188	240	234	272	280
1854 - - -	June 3 - 22	31	31	38	25	32	46	58	84	142	195	192	214	243	276	232
1866 - - -	June 2 - 19	22	20	43	67	102	150	221	349	354	264	194	129	128	132	110

Number of Week -	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1849 - - -	238	163	135	91	51	42	31	25	21	16	17	17	14	13	9
1854 - - -	190	165	98	102	78	46	33	35	31	21	19	19	25	20	16
1866 - - -	98	67	69	47	55	32	28	33	22	26	15	10	–	–	–

In the Table for the 30th week ending 28th July, published on Wednesday morning 1st August, the complete coincidence of the cholera field wit the field of supply of the East London Water Company was pointed out, in the hope that the state of its water might be immediately looked t The weekly report was published on Wednesday morning 1st August; on that day the engineer of the Company called at the General Registe Office, and on the day following he published a letter in the daily journals showing that he fully appreciated the importance of the crisis. The description of the works and Dr. Frankland's analysis of the waters were published in the following week (31st), when the eruption in the East Londo field began to decline. It will be borne in mind that the deaths are registered three or four days after they occur, and that cholera matter woul remain in the mains and butts some time after the supply of purer water was commenced. The actual deaths on each day are given in a Tabl published in the Supplement to the Weekly Return, No. 37, p. 547. In the districts supplied by the East London Company, including We Ham, they were 170 on 1st August, and 155, 114, 112, 119, 115, and 84 successively on the six following days.

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* *See* Weekly Return, No. 48, page 381.

DISTRICTS.	June 30.	July 7.	July 14.	July 21.	July 28.	Aug. 4.	Aug. 11.	Aug. 18.	Aug. 25.	Sept. 1.	Sept. 8.	Sept. 15.	Sept. 22.	Sept. 29.	Oct. 6.	Oct. 13.	Oct. 20.	Oct. 27.	Nov. 3.	Nov. 10.	Nov. 17.	Nov. 24.	Dec. 1.	Total in the 23 Weeks.
LONDON	6	14	32	346	904	1,053	781	455	265	198	157	182	150	177	182	207	144	112	73	67	32	8	3	5,548
WEST DISTRICTS	2	3	2	11	12	12	8	7	3	6	12	10	14	12	16	30	13	8	3	1	–	–	–	185
NORTH DISTRICTS	1	1	4	6	20	46	38	15	12	15	20	27	28	36	37	38	35	14	8	7	1	1	1	411
CENTRAL DISTRICTS	–	1	3	1	15	32	23	16	13	9	12	20	19	28	31	39	27	14	11	10	5	–	–	329
EAST DISTRICTS	3	5	20	308	818	916	673	369	198	122	74	77	56	55	50	65	34	26	13	16	14	3	2	3,917
SOUTH DISTRICTS	–	4	3	20	39	47	39	48	39	46	39	48	33	46	48	35	35	50	38	33	12	4	–	706
1. Kensington	–	2	–	11	7	5	3	2	1	2	2	4	7	2	7	16	8	5	–	–	–	–	–	84
2. Chelsea	–	1	–	–	1	–	1	1	1	1	6	1	3	1	1	1	–	1	–	1	–	–	–	21
3. St. George, Hanover-square	–	–	1	–	2	–	1	3	–	1	2	3	–	1	1	1	1	–	–	–	–	–	–	17
4. Westminster	–	–	1	–	1	4	1	–	–	2	2	–	3	7	4	10	3	2	2	–	–	–	–	42
5. St. Martin-in-the-Fields	–	–	–	–	1	–	–	–	–	–	–	1	1	–	3	2	–	–	1	–	–	–	–	9
6. St. James, Westminster	2	–	–	–	–	3	2	1	1	–	–	1	–	1	–	–	1	–	–	–	–	–	–	12
7. Marylebone	–	–	–	2	3	1	2	1	1	6	6	3	5	3	3	7	2	1	2	4	–	–	–	52
8. Hampstead	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	2
9. Pancras	–	1	2	–	10	6	6	2	2	3	1	9	10	15	24	15	17	8	4	–	1	–	–	136
10. Islington	1	–	2	–	2	19	12	6	2	3	7	7	5	13	5	15	12	3	1	3	–	–	1	119
11. Hackney	–	–	–	4	5	20	17	6	7	3	6	7	8	5	5	1	4	2	1	–	–	1	–	102
12. St. Giles	–	–	–	–	1	–	3	–	1	1	4	5	2	6	8	7	5	2	–	3	–	–	–	48
13. Strand	–	–	–	–	2	4	2	2	1	–	1	1	3	1	3	3	–	–	1	3	2	–	–	29
14. Holborn	–	–	–	–	–	–	–	1	1	2	–	1	1	2	4	4	3	–	2	–	1	–	–	22
15. Clerkenwell	–	1	2	–	2	3	–	1	–	2	3	3	3	4	4	7	6	1	3	–	–	–	–	45
16. St. Luke	–	–	–	–	2	3	1	2	1	2	1	1	3	6	4	8	3	5	1	1	2	–	–	46
17. East London	–	–	–	–	5	12	8	4	5	2	2	7	2	5	1	2	1	1	1	1	–	–	–	59
18. West London	–	–	–	1	2	8	6	3	3	–	–	2	4	4	5	6	7	4	3	2	–	–	–	60
19. London City	–	–	1	–	1	2	3	3	1	–	1	–	1	–	2	2	2	1	–	–	–	–	–	20
20. Shoreditch	–	2	2	5	7	16	19	4	12	4	7	6	6	11	6	13	3	2	4	–	3	1	–	133
21. Bethnal Green	1	1	4	43	90	166	108	69	30	24	6	14	8	12	10	8	7	6	–	–	3	–	–	610
22. Whitechapel	–	–	2	25	131	174	178	92	50	41	36	30	23	22	27	27	12	11	5	7	2	1	2	898
23. St. George-in-the-East	–	–	1	25	79	85	86	48	24	9	7	5	3	1	3	1	1	2	–	3	2	1	–	386
24*a*. Stepney	–	–	6	67	135	135	90	58	24	10	9	2	5	3	1	6	3	–	–	2	–	–	–	556
24*b*. Mile-end Old Town	–	1	1	52	122	140	68	42	20	11	2	7	5	2	1	7	6	5	3	3	3	–	–	501
25. Poplar	2	1	4	91	254	200	124	56	38	23	7	13	6	4	2	3	2	–	1	1	1	–	–	833
26. St. Saviour, Southwark	–	–	–	–	1	3	7	5	2	3	–	3	4	1	1	–	1	–	1	–	–	–	–	32
27. St. Olave, Southwark	–	–	–	2	1	–	–	–	2	1	–	1	–	1	–	2	2	3	–	2	–	3	–	20
28. Bermondsey	–	–	1	1	2	2	4	3	4	2	3	–	2	5	1	–	1	1	–	1	–	–	–	33
29. St. George, Southwark	–	2	–	2	2	4	2	3	–	–	–	2	2	7	3	2	2	1	1	3	–	–	–	38
30. Newington	–	1	–	2	–	1	–	1	1	1	2	–	–	1	4	–	4	2	–	1	2	–	–	23
31. Lambeth	–	1	1	3	7	5	2	13	2	4	5	4	6	11	13	13	11	4	1	6	1	–	–	113
32. Wandsworth	–	–	–	–	3	3	7	1	2	4	6	4	2	2	1	–	2	–	1	2	–	–	–	40
33. Camberwell	–	–	1	7	9	3	1	1	1	5	4	4	–	2	3	1	–	–	1	2	1	–	–	46
34. Rotherhithe	–	–	–	–	4	2	3	1	2	2	1	2	1	1	2	1	2	–	–	1	–	–	–	25
35. Greenwich	–	–	–	3	10	23	12	19	22	19	17	25	14	13	17	15	7	24	20	13	7	1	–	281
36. Lewisham	–	–	–	–	–	1	1	1	1	5	1	3	2	2	3	1	3	15	13	2	1	–	–	55

Note.—The numbers in the above Table are uncorrected for Deaths by Cholera in the several hospitals. For the number of persons who have died by Cholera in hospitals not situated in the districts in which the deceased persons lived, *see* Table on page 909.

NUMBER of DEATHS Registered from DIARRHŒA since the Commencement of the Epidemic, from Week ending 30th June to Week ending 1st December 1866.

Number of Week	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	Total in the 23 Weeks.
DISTRICTS.	June 30.	July 7.	July 14.	July 21.	July 28.	Aug. 4.	Aug. 11.	Aug. 18.	Aug. 25.	Sept. 1.	Sept. 8.	Sept. 15.	Sept. 22.	Sept. 29.	Oct. 6.	Oct. 13.	Oct. 20.	Oct. 27.	Nov. 3.	Nov. 10.	Nov. 17.	Nov. 24.	Dec. 1.	
LONDON	67	102	150	221	349	354	264	194	129	128	132	110	98	67	69	47	55	32	28	33	22	26	15	2,692
WEST DISTRICTS	11	16	18	37	48	46	31	28	15	12	18	14	11	9	8	8	6	3	4	7	3	6	7	366
NORTH DISTRICTS	20	23	37	54	78	79	51	40	21	24	19	11	19	11	8	3	13	8	5	5	9	5	5	548
CENTRAL DISTRICTS	5	18	28	31	44	42	31	22	13	18	14	15	17	17	18	5	8	4	5	3	2	3	1	364
EAST DISTRICTS	14	26	37	60	123	125	101	63	41	43	44	35	24	18	17	17	11	7	7	7	3	2	–	825
SOUTH DISTRICTS	17	19	30	39	56	62	50	41	39	31	37	35	27	12	18	14	17	10	7	11	5	10	2	589
1. Kensington	6	8	9	23	29	30	21	18	11	5	10	8	6	3	2	4	3	3	1	3	2	4	1	210
2. Chelsea	1	1	2	5	6	4	5	3	1	–	2	–	–	–	1	3	1	–	2	1	–	–	1	39
3. St. George, Hanover-square	–	3	3	4	5	5	2	3	1	1	1	2	–	2	2	–	2	–	–	1	1	1	2	41
4. Westminster	3	2	3	2	6	4	3	2	1	4	4	2	3	2	3	1	–	–	–	–	–	–	2	47
5. St. Martin-in-the-Fields	1	1	1	2	1	2	–	2	1	–	1	1	2	–	–	–	–	–	1	1	–	1	1	19
6. St. James, Westminster	–	1	–	1	1	1	–	–	–	2	–	1	–	2	–	–	–	–	–	1	–	–	–	10
7. Marylebone	2	3	12	17	16	24	17	10	4	8	5	3	3	3	5	1	5	3	1	1	3	–	1	147
8. Hampstead	–	1	–	2	1	1	2	1	–	–	–	–	1	–	–	–	1	–	–	–	–	–	–	10
9. Pancras	8	12	17	16	37	23	10	11	6	7	4	1	8	4	–	1	2	2	1	1	2	3	1	177
10. Islington	7	4	5	15	17	25	15	12	7	7	4	7	6	1	1	1	4	1	2	1	1	1	3	147
11. Hackney	3	3	3	4	7	6	7	6	4	2	6	–	1	3	2	–	1	2	1	2	3	1	–	67
12. St. Giles	–	3	9	10	11	4	7	3	–	3	3	4	1	3	4	–	2	–	1	1	1	–	–	70
13. Strand	–	2	2	1	2	–	1	3	1	1	–	3	4	1	2	–	1	–	–	–	–	–	–	24
14. Holborn	1	2	5	6	7	8	3	2	2	1	2	1	1	6	4	2	1	2	–	–	–	1	–	57
15. Clerkenwell	3	3	4	7	13	15	7	6	1	6	2	2	4	2	3	1	1	2	2	–	–	1	–	85
16. St. Luke	1	4	2	3	7	6	11	4	7	2	2	3	4	3	–	2	2	–	1	2	–	1	1	68
17. East London	–	1	3	2	3	4	–	2	–	–	–	–	1	1	3	–	1	–	–	–	–	–	–	21
18. West London	–	2	2	1	1	4	1	1	1	3	2	2	2	1	1	–	–	–	–	–	1	–	–	25
19. London, City	–	1	1	1	–	1	1	1	1	2	3	–	–	–	1	–	–	–	1	–	–	–	–	14
20. Shoreditch	4	2	10	7	10	17	9	7	6	5	6	3	7	3	2	6	4	2	2	1	1	1	–	115
21. Bethnal Green	4	6	6	9	23	27	21	11	10	7	9	9	3	6	4	4	2	1	2	1	–	–	–	165
22. Whitechapel	1	5	6	12	22	12	12	6	5	7	5	4	5	1	1	2	–	1	1	2	–	–	–	110
23. St. George-in-the-East	–	3	1	10	6	9	11	7	2	4	6	7	1	4	1	1	1	1	1	–	–	–	–	76
24*a*. Stepney	1	2	4	8	25	21	9	11	2	3	8	3	2	–	2	1	1	–	–	–	–	–	–	103
24*b*. Mile-end Old Town	2	3	7	4	14	15	12	7	4	4	2	4	2	3	–	1	2	1	–	1	–	–	–	88
25. Poplar	2	5	3	10	23	24	27	14	12	13	8	5	4	1	7	2	1	1	1	2	2	1	–	168
26. St. Saviour, Southwark	1	2	2	2	8	3	3	2	2	–	2	2	2	1	–	1	3	–	–	–	–	1	–	37
27. St. Olave, Southwark	1	–	3	1	1	1	2	–	1	–	–	2	–	2	1	1	–	1	–	–	–	–	–	17
28. Bermondsey	3	3	2	8	6	7	12	4	10	7	5	2	2	–	1	–	–	–	1	–	1	1	–	75
29. St. George, Southwark	2	2	2	3	4	4	1	5	1	2	1	1	2	1	2	1	1	–	–	1	–	1	1	38
30. Newington	1	2	1	2	2	5	5	6	1	2	2	4	2	1	1	–	1	1	–	–	–	1	–	40
31. Lambeth	3	7	5	13	11	24	12	13	6	10	3	8	4	4	3	5	3	3	1	4	2	4	–	148
32. Wandsworth	2	1	3	3	4	5	6	6	4	1	4	1	1	1	2	5	3	2	–	1	–	1	–	56
33. Camberwell	2	2	4	5	9	5	1	1	5	1	4	3	2	–	2	–	–	1	1	1	–	–	–	49
34. Rotherhithe	–	–	1	–	2	1	1	1	–	1	1	1	2	–	–	–	–	–	1	–	–	–	–	12

BLE showing the WATER COMPANIES supplying each District, the Area in Acres, the Number of Inhabited Houses in 1861, Population 1851, 1861, and 1866, and Deaths Registered in Twenty-three Weeks ending 1st December 1866, from ALL CAUSES, from CHOLERA, and from DIARRHŒA.

ber cts.	COMPANIES furnishing the greater Part of the WATER SUPPLY.	Area in Statute Acres.	Number of Inhabited Houses enumerated in 1861.	POPULATION.			DEATHS REGISTERED in 23 Weeks ending 1st December 1866.*			
				1851. Enumerated.	1861. Enumerated.	1866. Estimated.	All Causes.	Cholera.	Diarrhœa.	Cholera and Diarrhœa.
	LONDON - - - - -	77,997	359,421	2,362,236	2,803,989	3,037,991	36,423	5,548	2,692	8,240
	DISTRICTS supplied by the THAMES WATER COMPANIES, viz. :—									
	5 (*a*) by Grand Junction, West Middlesex, and Chelsea - -	11,794	67,719	473,077	567,053	615,604	5,930	210	484	694
	9 (*b*) by Southwark and Lambeth	22,951	84,593	482,435	579,748	638,292	6,929	371	472	843
	DISTRICTS supplied by the LEA WATER COMPANIES, viz. :—									
	9 (*c*) by New River, drawing its water from the upper part of Lea River (82 per cent.), from Chadwell Spring, and other sources - - - - -	5,217	57,904	468,819	515,401	536,576	6,247	409	509	918
	6 (*d*) by East London from Old Ford Reservoir - - -	5,584	58,886	376,265	441,704	471,109	9,539	3,729	710	4,439
	3 (*e*) by New River and by East London from Lea Bridge -	4,728	34,953	212,092	253,346	271,617	3,001	348	203	551
	DISTRICTS supplied by the GRAND JUNCTION, NEW RIVER, and WEST MIDDLESEX COMPANIES - -	5,132	27,838	215,348	253,220	269,537	2,664	144	197	341
	DISTRICTS supplied mainly by the KENT COMPANY, from Artesian Wells, and partially by SOUTHWARK and LAMBETH COMPANIES	22,591	27,528	134,200	193,427	235,256	2,113	337	117	454

s Company nishing f Supply.	DISTRICTS.									
J. C.	3. St. George, Hanover-square	1,161 *w*	10,437	73,230	87,771	94,315	711	15	41	56
C.	2. Chelsea - - - -	865 *w*	8,314	56,538	63,439	65,957	694	23	39	62
C.	4. Westminster - - -	917 *w*	6,798	65,609	68.213	68,268	757	42	47	89
WM. J.	7. Marylebone - - -	1,509	16,357	157,696	161,680	159,871	1,728	46	147	193
J. W M. c.	1. Kensington - - -	7,342 *w*	25,813	120,004	185,950	227,193	2,040	84	210	294
L. S.	30. Newington - - -	624	12,740	64,816	82,220	92,680	914	24	40	64
S. L.	29. St. George, Southwark -	282	7,238	51,824	55,510	57,498	686	40	38	78
S. L.	32. Wandsworth - - -	11,695 *w*	11,186	50,764	70,403	82,079	860	41	56	97
S. L.	33. Camberwell - - -	4,342	12,098	54,667	71,488	81,818	833	48	49	97
S.	34. Rotherhithe - - -	886 *w*	3,521	17,805	24,502	28,767	287	26	12	38
L. S.	31. Lambeth - - - -	4,015 *w*	22,910	139,325	162,044	174,904	1,829	113	148	261
S.	27. St. Olave, Southwark -	169 *w*	2,209	19,375	19,056	18,914	433	16	17	33
S. L.	28. Bermondsey - - -	688 *w*	8,220	48,128	58,355	64,310	695	36	75	111
S. L.	26. St. Saviour, Southwark -	250 *w*	4,471	35,731	36,170	36,422	392	27	37	64
N. c.	5. St. Martin-in-the-Fields -	305 *w*	2,240	24,640	22,680	21,370	232	9	19	28
N.	19. London City - - -	434 *w*	6,362	55,932	45,555	39,756	264	21	14	35
N.	13. Strand - - - -	172 *w*	3,775	44,417	42,979	40,883	460	28	24	52
N.	10. Islington - - - -	3,127	20,704	95,329	155,341	193,648	2,182	86	147	233
N.	14. Holborn - - - -	196	4,109	46,621	44,862	42,556	537	24	57	81
N.	16. St. Luke - - - -	220	6,356	54,055	57,073	56,710	769	90	68	158
N.	12. St. Giles - - - -	245	4,690	54,214	54,076	52,226	658	50	70	120
N.	15. Clerkenwell - - -	380	7,088	64,778	65,681	63,957	716	71	85	156
N.	18. West London - - -	138 *w*	2,580	28,833	27,145	25,470	429	30	25	55
E.†	21. Bethnal Green - - -	760	14,731	90,193	105,101	110,289	2,140	696	165	261
E.†	24*b*. Mile End Old Town -	681	10,758	56,602	73,064	80,695	1,343	526	88	614
E.†	23. St. George-in-the-East -	243	6,169	48,376	48.891	47,779	1,059	443	76	519
E.†	25. Poplar - - - -	2,918 *w*	11,123	47,162	79,196	99,762	2,111	849	168	1,017
E.† N	22. Whitechapel (Lond. Hosp.)	406 *w*	8,664	79,759	78,970	76,386	1,704	592	110	702
E.†	24*a*. Stepney - - - -	576 *w*	7,441	54,173	56,572	56,198	1,182	623 ‡	103	726
N. E.	20. Shoreditch - - -	646	17,072	109,257	129.364	136,836	1,546	174	115	289
N. E.†	11. Hackney - - -	3,929	13,392	58,429	83,295	97,120	1,098	114	67	181
N. E.	17. East London	153	4,489	44,406	40,687	37,661	357	60	21	81
N. WM.	8. Hampstead - - -	2,252	2,653	11,986	19,106	23,557	169	2	10	12
J. N.	6. St. James, Westminster -	164	3.333	36,406	35,326	34,155	282	15	10	25
N. H. WM.	9. Pancras - - - -	2,716	21,852	166,956	198,788	211,825	2,213	127	177	304
K. L.	36. Lewisham - - -	17,224 *w*	9,707	34,835	65,757	90 420	605	55	32	87
K. S.	35. Greenwich - - -	5,367 *w*	17,821	99,365	127,670	144,836	1,508	282	85	367
	Stratford (Sub-district) -	8,648 *w*	2,773	10,586	15,994	19,855	- -	157	21	178
	West Ham (Sub-district)		3,875	9,968	25,195	40,957 §	- -	- -	Return not received.	

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areas marked thus (*w*) include water.

several Water Companies are designated by letters; thus, the New River Company by N., the Grand Junction by J., Chelsea by C., West Middlesex by W M., East on by E., Hampstead by H., Southwark by S., Lambeth by L., and Kent by K. In cases where a district is supplied by more than one Company, the initial of the any supplying the greater part is placed first. Where a Company supplies only a small part of the district, it is indicated by a small initial letter.

When persons have died of cholera in hospitals not situated in the districts in which they were attacked, the deaths are referred in the Table, not to the hospital districts, those districts from which the patients had been removed. A Table on p. 909 shows the number of cases to which this rule has been applied.

hat part of Hackney District served by the East London Company is, it is believed, supplied from Lea Bridge after filtration; the East Districts are supplied from servoirs at Old Ford.

his number (623) includes 46 deaths registered from cholera in the Limehouse District Cholera Hospital. The returns failed to state from what districts the patients brought.

his estimate for the West Ham Sub-district has been made on the assumption that the population increased since 1861 at the same rate as it did in the interval between ensuses of 1851 and 1861. Mr. Marsh, the Registrar for this sub-district, estimates the population in 1866 at 35,000.

TABLE showing the WATER COMPANIES supplying each District, the Elevation, Persons to an Ac
Annual Value of Houses, Annual Value of House and Shop Room to each Person in the £., Poor R
in the £., of House Rent, Annual Mortality in each of the Ten Years 1841–50 and 1851–60 from A
CAUSES; and Number of Deaths, in Twenty-three Weeks ending 1st December 1866, to 10,000 Pers
Living, from ALL CAUSES, from CHOLERA, and from DIARRHŒA.

Number of Districts.	COMPANIES furnishing the greater Part of the WATER SUPPLY.	Elevation in Feet above Trinity High-water Mark of the Thames.	Persons to an Acre in 1866.	Annual Value of Houses, Year ending April 1843.	Annual Value of House and Shop Room to each Person in £.	Poor Rate in the £. of House Rent.	ANNUAL MORTALITY from all Causes. Deaths to 1,000 Living.		NUMBER of DEATHS in 23 Weeks to 10,000 Persons Li		
							1841–50.	1851–60.	All Causes.	Cholera.	Diarrhœa.
				£.	£.	£.					
	LONDON - - - - -	39	39·0	40	5·589	·064	25	24	119·9	18·3	8·9
14	DISTRICTS supplied by the THAMES WATER COMPANIES, viz.:—	†	†	†	†	†	†	†			
	5 (*a*) by Grand Junction, West Middlesex, and Chelsea - -	35	73·7	58	7·131	·041	23	23	96·3	3·4	7·9
	9 (*b*) by Southwark and Lambeth	4	89·5	26	4·223	·086	27	25	108·6	5·8	7·4
18	DISTRICTS supplied by the LEA WATER COMPANIES, viz.:										
	9 (*c*) by New River, drawing its water from upper part of Lea River (82 per cent.), from Chadwell Spring, and other sources - - - - -	53	166·9	64	7·692	·051	25	24	116·4	7·6	9·5
	6 (*d*) by East London from Old Ford Reservoir - - -	24	130·0	25	3·937	·081	26	26	202·5	79·2	15·1
	3 (*e*) by New River, and by East London from Lea Bridge -	47	160·9	28	4·108	·081	24	23	110·5	12·8	7·5
3 (*f*)	DISTRICTS supplied by the GRAND JUNCTION, NEW RIVER, and WEST MIDDLESEX COMPANIES - -	160	98·9	70	7·781	·033	21	21	98·8	5·3	7·3
2 (*g*)	DISTRICTS supplied mainly by the KENT COMPANY from Artesian Wells, and partially by SOUTHWARK and LAMBETH COMPANIES	18	16·1	25	4·101	·065	22	21	89·8	14·3	5·0
Water Company furnishing Chief Supply.	DISTRICTS.										
(*a*) J. C.	3. St. George, Hanover-square	34	81·2	110	13·169	·018	19	19	75·4	1·6	4·3
C.	2. Chelsea - - - -	12	76·3	29	4·210	·067	27	26	105·2	3·5	5·9
C.	4. Westminster - - -	3	74·4	36	4·189	·039	27	26	110·9	6·2	6·9
W M. J.	7. Marylebone - - -	87	105·9	71	7·586	·043	24	24	108·1	2·9	9·2
J. W M. C.	1. Kensington - - -	40	30·9	43	6·503	·039	20	19	89·8	3·7	9·2
(*b*) L. S.	30. Newington - - -	-1	148·5	22	3·788	·075	26	24	98·6	2·6	4·3
S. L.	29. St. George, Southwark -	0	203·9	22	3·318	·089	30	27	119·3	7·0	6·6
S. L.	32. Wandsworth - - -	24	7·1	29	4·839	·072	22	22	103·6	4·9	6·7
S. L.	33. Camberwell - - -	4	18·8	25	4·508	·038	24	23	101·8	5·9	6·0
S.	34. Rotherhithe - - -	0	32·5	23	4·238	·143	28	25	99·8	9·0	4·2
L. S.	31. Lambeth - - - -	3	43·6	28	4·389	·072	25	23	104·6	6·5	8·5
S.	27. St. Olave, Southwark -	4	111·9	35	4·559	·079	30	29	228·9	8·5	9·0
S. L.	28. Bermondsey - - -	0	93·5	18	3·077	·134	28	26	108·1	5·6	11·7
S. L.	36. St. Saviour, Southwark -	3	145·7	36	5·291	·076	30	29	107·6	7·4	10·2
(*c*) N. C.	5. St. Martin-in-the-Fields -	38	70·1	119	11·844	·039	24	23	108·6	4·2	8·9
N.	19. London City - - -	31	91·6	117	17·676	·056	22	22	66·4	5·3	3·5
N.	13. Strand - - - -	50	237·7	66	7·374	·047	24	24	112·5	6·8	5·9
N.	10. Islington - - - -	94	61·9	35	5·494	·030	19	21	112·7	4·4	7·6
N.	14. Holborn - - - -	53	217·1	52	5·883	·034	26	26	126·2	5·6	13·4
N.	16. St. Luke - - - -	51	257·8	28	3·731	·081	27	27	135·6	15·9	12·0
N.	12. St. Giles - - - -	68	213·2	60	5·635	·052	26	28	126·0	9·6	13·4
N.	15. Clerkenwell - - -	65	168·3	33	4·138	·057	24	23	112·0	11·1	13·3
N.	18. West London - - -	29	184·6	65	7·454	·067	29	25	168·4	11·8	9·8
(*d*) E. ‡	21. Bethnal Green - - -	38	145·1	9	1·480	·136	25	23	194·0	63·1	15·0
E. ‡	24*b*. Mile End Old Town -	30	118·5	20	3·319	·066	25	24	166·4	65·2	10·9
E. ‡	23. St. George-in-the-East -	21	196·6	32	4·753	·080	29	29	221·6	92·7	15·9
E. ‡	25. Poplar - - - -	8	34·2	44	7·360	·060	22	24	211·6	85·1	16·8
E. ‡ N.	22. Whitechapel (Lond. Hosp.)	32	188·1	26	3·388	·075	29	28	223·1	77·5	14·4
E. ‡	24*a*. Stepney - - - -	11	97·6	20	3·319	·066	25	27	210·3	110·9 §	18·3
(*e*) N. E.	20. Shoreditch - - -	48	211·8	20	3·103	·082	27	24	113·0	12·7	8·4
N. E. ‡	11. Hackney - - - -	53	24·7	25	4·397	·074	19	19	113·1	11·7	6·9
N. E.	17. East London - - -	40	246·2	38	4·823	·088	27	27	94·8	15·9	5·6
(*f*) N. W M.	8. Hampstead - - -	350	10·5	40	5·804	- -	18	17	71·7	·8	4·2
J. N.	6. St. James, Westminster -	58	208·3	128	12·669	·023	22	23	82·6	4·4	2·9
N. H. WM.	9. Pancras - - - -	73	78·0	41	4·871	·042	23	22	104·5	6·0	8·4
(*g*) K. L.	36. Lewisham - - -	28	5·2	27	4·824	·049	17	18	66·9	6·1	3·5
K. S.	35. Greenwich - - -	8	27·0	22	3·379	·081	27	24	104·1	19·5	5·9
	Stratford (Sub-district) -	- -	- -	- -	- -	- -	-	-	-	79·1	10·6
	West Ham (Sub-district)	- -	- -	- -	- -	- -	-	-	-	Return not receive	

The several Water Companies are designated by letters, thus: the New River Company by N., the Grand Junction by J., Chelsea by C., West Middlesex by W
East London by E., Hampstead by H., Southwark by S., Lambeth by L., and Kent by K. In cases where a district is supplied by more than one Company, the initi
the Company supplying the greater part is placed first. Where a Company supplies only a small part of the district, it is indicated by a small initial letter.

* *See* note on p. 904, relating to Deaths in Hospitals.

† The results marked thus (†) for the *Aggregates of Districts* have been obtained by taking the mean of the several groups of districts.

‡ That part of Hackney District served by the East London Company is, it is believed, supplied from Lea Bridge after filtration; the East Districts are supplied m
from the reservoirs at Old Ford.

§ Of 623 deaths from cholera registered in Stepney, 46 occurred in the Limehouse District Cholera Hospital, but the returns failed to state from what district
patients were brought. If one-half of these cases are deducted from the 623 deaths, on the assumption that they belonged to other districts, the mortality of Ste
would be 106·8.

BLE showing the Names of the MEDICAL HEALTH OFFICERS appointed for the several Districts of *London*, he Average Annual Mortality from all Causes in each of the Ten Years 1841–50 and 1851–60, the Number of Deaths Registered in the 23 Weeks ending 1st December 1866 from ALL CAUSES and from CHOLERA nd DIARRHŒA, and the Proportional Number to 10,000 Living.

erage Annual Mortality 00 Persons Living m all Causes.		REGISTRARS' SUB-DISTRICTS.	Names of Medical Officers.	Deaths in 23 Weeks from			Deaths to 10,000 Living from		
–50.	1851–60.			All Causes.	Cholera.	Diarrhœa.	All Causes.	Cholera.	Diarrhœa.
		WEST DISTRICTS:							
		1. KENSINGTON:							
)	19	St. Mary, Paddington	Dr. Sanderson	2,040	84	210	89·8	3·7	9·2
		St. John, Paddington							
		Kensington Town	F. Godrich, jun.						
		Brompton							
		St. Peter, Hammersmith	F. J. Burge						
		St. Paul, Hammersmith							
		Fulham							
		2. CHELSEA:							
7	26	Chelsea, South	Dr. Barclay	694	23	39	105·2	3·5	5·9
		Chelsea, North-west							
		Chelsea, North-east							
		3. ST. GEORGE, HANOVER SQUARE:							
9	19	Hanover-square	Dr. Druitt	711	15	41	75·4	1·6	4·3
		May Fair							
		Belgrave	Dr. Aldis						
		4. WESTMINSTER:							
7	26	St. John, Westminster	B. Holt	757	42	47	110·9	6·2	6·9
		St. Margaret, Westminster							
		5. ST. MARTIN-IN-THE-FIELDS:							
4	23	Charing Cross	L. J. Beale	232	9	19	108·6	4·2	8·9
		Long Acre							
		6. ST. JAMES, WESTMINSTER:							
2	23	Berwick-street	Dr. Lankester	282	15	10	82·6	4·4	2·9
		St. James's-square							
		Golden-square							
		NORTH DISTRICTS:							
		7. MARYLEBONE:							
4	24	All Souls, Marylebone	Dr. J. Whitmore	1,728	46	147	108·1	2·9	9·2
		Cavendish-square							
		Rectory, Marylebone							
		St. Mary, Marylebone							
		Christchurch, Marylebone							
		St. John, Marylebone							
		8. HAMPSTEAD:							
8	17	Hampstead	C. F. J. Lord	169	2	10	71·7	·8	4·2

Note.—When persons have died of cholera in hospitals not situated in the districts in which they were attacked, the deaths referred in this Table, not to the hospital districts, but to those districts from which the patients had been removed. A ble on page 909 shows the number of cases to which this rule has been applied.

TABLE showing the Names of the Medical Health Officers appointed for the several Districts of *London*, &c.—*continued.*

Average Annual Mortality to 1,000 Persons Living from all Causes.		REGISTRARS' SUB-DISTRICTS.	Names of Medical Officers.	Deaths in 23 Weeks from			Deaths to 10,000 Living from		
1841–50.	1851–60.			All Causes.	Cholera.	Diarrhœa.	All Causes.	Cholera.	Diarrhœa.
		NORTH DISTRICTS—*contd*.							
		9. PANCRAS:							
23	22	Regent's Park, Pancras Tottenham-court Gray's-inn-lane Somers Town Camden Town Kentish Town	Dr. Hillier	2,213	127	177	104·5	6·0	8·4
		10. ISLINGTON:							
19	21	Islington, West Islington, East	Dr. Ballard	2,182	86	47	112·7	4·4	7·6
		11. HACKNEY:							
19	19	Stoke Newington Stamford Hill West Hackney Hackney South Hackney	Dr. Tripe	1,098	114	67	113·1	11·7	6·9
		CENTRAL DISTRICTS:							
		12 ST. GILES:							
26	28	St. George, Bloomsbury St. Giles, South St. Giles, North	Dr. Buchanan	658	50	70	126·0	9·6	13·4
		13. STRAND:							
24	24	St. Anne, Soho St. Mary-le-Strand St. Clement Danes	Dr. Conway Evans	460	28	24	112·5	6·8	5·9
		14. HOLBORN:							
26	26	St. George-the-Martyr St. Andrew, Eastern Saffron Hill	Dr. S. Gibbon	537	24	57	126·2	5·6	13·4
		15. CLERKENWELL:							
24	23	St. James, Clerkenwell Amwell, Clerkenwell Pentonville Goswell-street	Dr. Griffith	716	71	85	112·0	11·1	13·3
		16. ST. LUKE:							
27	27	Old-street City-road Whitecross-street Finsbury	Dr. Pavy	769	90	68	135·6	15·9	20·0
		17. EAST LONDON:							
27	27	St. Botolph Cripplegate	Dr. Letheby	357	60	21	94·8	15·9	5·6
		18. WEST LONDON:							
29	25	West London, North West London, South	ditto	429	30	25	168·4	11·8	9·8
		19. LONDON CITY:							
22	22	London City, South-west London City, North-west London City, South London City, South-east London City, North-east	ditto	264	21	14	66·4	5·3	3·5

TABLE showing the Names of the Medical Health Officers appointed for the several Districts of *London*, &c.—*continued.*

Average Annual Mortality to 1,000 Persons Living from all Causes.		REGISTRARS' SUB-DISTRICTS.	Names of Medical Officers.	Deaths in 23 Weeks from			Deaths to 10,000 Living from		
1841–50.	1851–60.			All Causes.	Cholera.	Diarrhœa.	All Causes.	Cholera.	Diarrhœa.
		EAST DISTRICTS.							
		20. SHOREDITCH:							
27	24	Holywell, Shoreditch St. Leonard, Shoreditch Hoxton New Town Hoxton Old Town Haggerstone, West Haggerstone, East	Dr. Barnes	1,546	174	115	113·0	12·7	8·4
		21. BETHNAL GREEN:							
25	23	Hackney Road Green, Bethnal Green Church, Bethnal Green Town, Bethnal Green	Dr. Sarvis	2,140	696	165	194·0	63·1	15·0
		22. WHITECHAPEL:							
29	28	Artillery, Whitechapel Spitalfields Mile End New Town Whitechapel, North Whitechapel Church Goodman's Fields Aldgate	J. Liddle	1,704	592	110	223·1	77·5	14·4
		23. ST. GEORGE-IN THE-EAST:							
29	29	St. Mary, St. George-in-the-East St. Paul, St. George-in-the-East St. John, St. George-in-the-East	Dr. S. Rygate	1,059	443	76	221·6	92·7	15·9
		24*a*. STEPNEY:							
25	27	Shadwell Ratcliff Limehouse	T. Orton	1,182	623	103	210·3	110·9	18·3
		24*b*. MILE END OLD TOWN:							
	24	Mile End Old Town, West Mile End Old Town, East	Dr. Corner	1,343	526	88	166·4	65·2	10·9
		25. POPLAR:							
22	24	Bow Poplar	Dr. Woodforde S. K. Ellison	2,111	849	168	211·6	85·1	16·8
		SOUTH DISTRICTS:							
		26. ST. SAVIOUR, SOUTHWARK:							
30	29	Christchurch St. Saviour	R. Bianchi	392	27	37	107·6	7·4	10·2
		27. ST. OLAVE, SOUTHWARK:							
		St. Olave St. John, Horsleydown	Dr. Vinen	433	16	17	228·9	8·5	9·0
		28. BERMONDSEY:							
28	26	St. James, Bermondsey St. Mary Magdalen Leather Market	W. Parker	695	36	75	108·1	5·6	11·7

TABLE showing the Names of the Medical Health Officers appointed for the several Districts of *London*, &c.—*continued.*

Average Annual Mortality to 1,000 Persons Living from all Causes.		REGISTRARS' SUB-DISTRICTS.	Names of Medical Officers.	Deaths in 23 Weeks from			Deaths to 10,000 Living from		
1841–50.	1851–60.			All Causes.	Cholera.	Diarrhœa.	All Causes.	Cholera.	Diarrhœa.
		SOUTH DISTRICTS—*continued.*							
		29. ST. GEORGE, SOUTHWARK:							
30	27	Kent-road - - - -	Dr. Bateson -	686	40	38	119·3	7·0	6·6
		Borough-road - - - -							
		London-road - - -							
		30. NEWINGTON:							
26	24	Trinity, Newington - -	Dr. Iliff - -	914	24	40	98·6	2·6	4·3
		St. Peter, Walworth - -							
		St. Mary, Newington - -							
		31. LAMBETH:							
25	23	Waterloo-road, First - -	Dr. Puckle -	1,829	113	148	104·6	6·5	8·5
		Waterloo-road, Second -							
		Lambeth Church, First -							
		Lambeth Church, Second -							
		Kennington, First - -							
		Kennington, Second - -							
		Brixton - - - -							
		Norwood - - - -							
		32. WANDSWORTH:							
22	22	Clapham - - - -	J. M'Donogh -	860	41	56	103·6	4·9	6·7
		Battersea - - - -	Dr. Connor - -						
		Wandsworth - - -	G. E. Nicholas -						
		Putney - - - -	R. H. Whiteman -						
		Streatham - - - -	D. C. Noel - -						
		33. CAMBERWELL:							
24	23	Dulwich - - - -	Dr. Bristowe -	833	48	49	101·8	5·9	6·0
		Camberwell - - -							
		Peckham - - - -							
		St. George, Camberwell -							
		34. ROTHERHITHE:							
28	25	Rotherhithe - - -	Dr. Murdock -	287	26	12	99·8	9·0	4·2
		35. GREENWICH:							
27	24	St. Paul, Deptford - -	H. N. Pink -	1,508	282	85	104·1	19·5	5·9
		St. Nicholas, Deptford -							
		Greenwich, West - -							
		Greenwich, East - -							
		Woolwich Dockyard - -	No Medical Officer						
		Woolwich Arsenal - -							
		36. LEWISHAM:							
17	18	Charlton and Kidbrooke -	Dr. Finch - -	605	55	32	66·9	6·1	3·5
		Plumstead - - - -	A. W. Allinson -						
		Eltham - - - -	Dr. King - -						
		Lee - - - - -	J. S. Burton -						
		Lewisham Village - -	F. E. Wilkinson -						
		Sydenham - - - -							

Appendix, No. 8.

TABLE showing the Corrections for Deaths by CHOLERA in HOSPITALS registered in the Twenty-three Weeks ending 1st December 1866.

DISTRICT in which the Hospital is situated.	NAME OF HOSPITAL.	Number of Deaths deducted belonging to other Districts.
St. George, Hanover-square	St. George's	2
Marylebone	Middlesex	6
St. Olave, Southwark St. Saviour's, Southwark	Guy's	9
Strand	King's College	2
Islington	Fever	37
West London	St. Bartholomew's	30
Whitechapel	London	222
	Cholera	87*
Pancras	Royal Free	11

Week ending Saturday, 15th December.

The deaths registered in London during the week were 1,389. It was the fiftieth week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,469. The deaths in the present return are less by 80 than the estimated number.

Two cases of cholera and 25 of diarrhœa were registered last week.

A boiler-maker, aged 18 years, died on 9th December, of bronchitis, after cholera, at 17, Orchard-street, Woolwich.

The son of a silk-dyer, aged one year, died on 10th December, of cholera (24 hours), at 17, Fleet-street, Bethnal Green.

Although the epidemic has subsided, isolated cases still demand the vigilant attention of the authorities. This is one of the lessons of the year. For while cholera raged between the Tower, the Isle of Dogs, and Victoria Park, over the area traversed by the Blackwall railway, and the Great Eastern railway as far as Stratford and West Ham, among a population in uninterrupted communication, through lines of streets, the Regent's Canal, and the Thames, with the rest of London and the surrounding districts, to which many of the infected persons living in the east of London fled, the conflagration was strictly circumscribed within well-defined bounds. The fierceness of the disease extended thus far and no further, although the movements of the people were as free as air. The futility of quarantine lines is so well known, that their establishment was never proposed in London. The supply of impure water was at once arrested; the water engineers grew careful; the sewage was now less inefficient than it ever had been before, for South London was drained. The health officers became vigilant; premonitory diarrhœa was treated; every case, as it occurred, was published to the world; and the cholera excreta were destroyed by carbolic acid and other disinfectants. The disease was communicated by contact with the poison in a few cases, but its general diffusion was stopped.

This is the secret of the success of London in controlling an epidemic that, during the year, has been so fatal in continental cities.

Week ending Saturday, 22nd December.

The deaths registered in London during the week were 1,377. It was the fifty-first week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,452. The deaths in the present return are less by 75 than the estimated number.

Two deaths from cholera, and 16 from diarrhœa, were registered during the week.

A coachmaker's labourer, aged 59 years, died on 17th December, at 10, Shouldham-street, Marylebone, of cholera (35 hours).

The widow of a publican, aged 36 years, died on 18th December, at 16, Exmouth-street, Mile-end Old Town, of choleraic diarrhœa (three days).

Week ending Saturday, 29th December.

The deaths registered in London during the week were 1,436. It was the fifty-second week of the year; and the average number of deaths for that week is, with a correction for increase of population, 1,554. The deaths in the present return are less than the estimated number by 118.

The daughter of a pen merchant, aged 16 years, died on 23rd December, at 3, Boar's-head-yard, Whitechapel, of cholera Asiatica (14 hours).

Fourteen deaths from diarrhœa were registered during the week.

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* In respect to 34 deaths in the Cholera Hospital, Spitalfields, the returns failed to mention from what districts the patients had been brought. These cases are therefore distributed according to the various proportions indicated by the complete returns.

In addition to the deaths in the above Table, 46 deaths by cholera were registered in the 23 weeks in the Limehouse District Cholera Hospital, situated in Stepney District, but the returns neglected to state from what district the patients were brought.

Appendix, No. 9.

Appendix, No. 9.

MEMORANDA as to WASTE of WATER at *Boston*, U.S., under Constant Supply.—Extracted from the Annual Reports of the Water Board to the City Council.

REPORT for Year 1859.

Page 31. Daily consumption, 13,175,000 gallons against 12,847,000 gallons previous year.

In 1858, consumption 72¼ gallons per head, estimating population at 178,000.

In 1859, if population taken at 183,000, consumption 72 gallons per head,—scarcely varying from that of 1857 and 1858.

" It seems as if we might now fairly conclude that the individual consumption had come to its maximum, the variation in three years not exceeding one gallon."

Meters applied more numerously than in previous years, and proposed to be used still more extensively.

Appendix, p. 4. Waste water from lake over dam into Sudbury river, in the year, 7,569,000,000 gallons.

REPORT for 1860.

Page 7. " Consumption of Water.—In the last Annual Report the following language was indulged in: 'It seems as if we might now fairly conclude that the individual consumption had come to its maximum, the variation in three years not exceeding one gallon,' say 72½ to 73 gallons, but the present year is a fearful example of the fallacy of such calculating. By the report of the engineer it appears that the average daily consumption of water has been 17,238,000 gallons. By the census returns it appears that the number of inhabitants is 177,902. This shows a consumption of 97 gallons for each individual, an amount believed to be without parallel in the civilized world. Of course there is nothing in the sales of the water that could lead to the expectation of such a monstrous increase, and we must again resort to the old story of extravagant and inordinate *waste*."

Lake never full to height of dam during year, so that whole available supply drawn, although rainfall 55½ inches against average of 48¾ inches.

With a rainfall of 55½ inches, the maximum yield of the lake will be 17,700,000 gallons; but as average only 48¾ inches, a proportional diminished supply can only be safely relied on.

Page 8. Capacity of aqueduct put to severest test that ought to be applied, and to work it under any increased head must be attended with the utmost hazard.

Conclusions:—

1st. That the lake cannot be relied on for any greater supply of water.

2nd. That the aqueduct can convey no more water than it has done this year.

" These conclusions are of a nature to arrest public attention and to induce inquiry. What is to be done? What use shall we make of the present quantity, in view of the great difficulty and expense of increase? Every effort should be made to guard against *waste*. * * * When all the unnecessary uses of the water are stopped, then, in case of insufficient quantity, it would become the policy of the City to cut off, one after another, the classes of takers for mechanical purposes. It is to be hoped, however, that the time is not near at hand when this will be necessary; it is only alluded to as indicating what would undoubtedly become the policy of the City at all times, in order to supply a full and needful quantity of pure water for domestic purposes. Meters continued to give satisfaction, and would be more extensively used."

REPORT for 1861.

Page 9. Dam at outlet of lake raised, and further supply from a pond brought into lake.

" With this addition to the source of supply there ought to be water enough for the city without any additional expense, and the Board are confident there would be were it not for the wasteful use of the water in the city. This has been a topic of discussion in the various water reports for several years. The present Board have adopted energetic measures by the aid of the police in preventing this evil, and these measures have been attended with marked success. At the same time the only efficient remedy must be found in the citizens themselves in the use of water, and in giving information of any wasteful use by others; or by the general adoption throughout the city of water-meters, and an entire change in the assessment and collection of water rates."

Some methods of using water supply highly objectionable—hopper closets an instance. No water to be supplied to hopper closets made after 1st January 1862. Page 10.

Most satisfactory method of charging for water would be by actual measurement; but practical difficulties against introduction of meters over the whole city, and plan would require expenditure of half a million dollars for meters. Page 11.

Average daily consumption 18,189,300 gallons, being 951,000 gallons in excess of previous year. Page 47.

On the 1st of January 1862, water in lake 7 ft. 11 in. below high-water mark, leaving only 2 ft. 1 in. above low-water mark. Page 44.

As consumption of water increased so fast, and lake supply would very soon be all used, engineer recommended surveys to be made to determine a new source. Page 46.

REPORT for 1862.

Average daily consumption 16,600,000 gallons, being 1,589,300 less than in 1861. Saving mainly owing to meters being placed in establishments where larger quantities of water used. Page 10.

Surplus water from lake into river during year, 33,200,000 gallons, equal to about two days' supply. Page 43.

Quantity used equal to annual average rainfall and all that lake can be relied on to furnish annually.

More storage room needed, as well as a new source of supply.

REPORT for 1863.

Two hundred and fifty-four meters in action. Their use, where large quantities of water consumed, proved to be very satisfactory; in places where large numbers of hands employed, a great deal of water wasted, but when proprietors obliged to pay for it by the gallon they find it for their interest to do what they can to prevent this waste. Page 7.

Average daily consumption, 16,238,500 gallons. Page 54.

REPORT of 1864.

WASTE OF WATER.

"This subject, which has been brought to the notice of the city council in the annual reports of this board for many years, has been and will continue to be a source of great anxiety, and one that will require active measures to prevent. The last two months the lake was at such a low point that the board believed it to be their imperative duty to use every means in their power to put a stop to the enormous waste which they felt sure was taking place, and they commenced by issuing a circular to the citizens, calling their attention to the fact. This had a very good and marked effect, but still a great waste continued; and, as the lake was still falling, a second notice was issued, and persons having house hose were requested to discontinue its use; and it was also decided to employ a suitable number of persons to examine all the water fixtures throughout the city, and report each day to the office any waste that might be discovered, and also all leaks. This was immediately carried out by the water registrar, and the result has proved that nearly one-half of the water that has been brought into the city has been wasted. For the first ten days, which included about one-third of the city, there were reported 531 cases where water was running to waste, and 1,353 cases where fixtures were out of order and water was leaking on that account. Page 8.

"We have no doubt whatever but that the supply of water is ample for years to come, if used in a liberal and proper manner.

"The active measures which the board has adopted have already greatly reduced the consumption, or we should say, waste of water, and our reservoirs are now nearly full. According to the estimate of the engineer, the average amount of water brought into the city daily is 16,681,000 gallons; to bring this enormous quantity we have been obliged to run our conduit to its utmost capacity, and thereby endangering the works; and as we know that a large part of this is wasted, we shall continue to use every means in our power to find out and prevent the same." Page 9.

Three

Appendix, No. 9.

Three hundred and twelve meters in use. Nothing but their great cost prevents their application to all consumers, as the only sure way to prevent a continual waste, as consumers give their fixtures more attention when they are paying for any leakage.

Page 33. Twenty men employed by registrar to examine and report all places where water-fixtures out of order and water found running to waste.

Page 49. Daily consumption in November and December about 2,000,000 gallons less than corresponding month last year, owing to increased vigilance and care on the part of citizens inspired by fears of short supply, and by the extra exertions of the board and its officers in tracing out sources of waste.

Report for 1865.

Page 6. "Unless we are favoured with copious rains during the summer and fall, it will require the strictest economy to keep up the supply of water throughout the year without the doubtful and expensive expedient of raising it by artificial means to the level of the conduit. By the tables of the engineer it appears that the rainfall for 1865 was the average of the last ten years. Yet there was during the last year, and is now, a very general complaint in the neighbouring towns of the scarcity of water, and much inconvenience, if not sickness, has been consequent upon it.

"The constant supply with which our inhabitants have been blessed should always be kept in mind, and the efforts of the water board *continue* to be seconded by all good citizens, not only by preventing waste upon their own premises, but by giving prompt notice of waste by others. The apprehension of a short supply will necessitate the greatest watchfulness on our part; and if it is found necessary to subject the takers to some slight inconvenience from the visits of the inspectors, it must be borne with patience, as it is only in this way we can detect the improvident and wasteful.

Page 7. "The number of notices issued for leaks, from 1st January 1865 to 1st May 1866 - - - - - - - - - - - - 9,555

"Number of persons fined for waste - - - - - - - 3,093"

Hopper closets increased in number to 8,000, and consumption of waste found to be many times in excess of ordinary pan closets. The closets with *improper fixtures* one cause of excessive use or waste.

"Board contemplate appointment of two or more officers, whose duty it will be, upon an alarm of fire, to assist in opening the hydrants, and to see that they are properly closed after the hosemen have left; to visit the hydrants used for supplying the steamboats with water for cleansing decks and other purposes; and to have a general supervision of all hydrants so far as to prevent improper use. It will be desirable that these officers have police powers. In other cities a large number of such officers are advantageously employed."

Page 8. Average daily consumption for domestic purposes found by actual experiment to be $24\frac{9}{10}$ gallons per head.

"The number of meters has been largely increased. If it were not for their high cost (about 50 dollars each) it would be desirable to deliver all the water by measure, and then each taker would pay for what he consumed. If such a system could be adopted, the quantity of water drawn from the lake would be reduced nearly, if not quite, one-third.

Page 9. "However desirable this may be, it cannot be accomplished at present, for we have failed as yet to find a cheap reliable meter. The whole number of takers is 27,489, and much the largest proportion pay less than 10 dollars a year; consequently, the expense at present cost would nearly consume the income."

Page 10. Price of water by meter settled at uniform rate of 3 cents per 100 gallons = 1*s.* 3*d.* per 1,000 gallons.

Consumption of water for 1865 reduced 25 per cent. as compared with consumption of 1864; one consequence of this economy was that the citizens who resided upon the higher grades were accommodated with a more regular and abundant supply of water than for some years past.

Page 51. Daily average supply in year, 12,662,000 gallons.

Page 52. Waste in night—average 282,000 gallons per *hour*, or 6,768,000 gallons per day.

Page 53. Maximum consumption per day, 18,000,000 gallons.

Appendix, No. 10.

METROPOLIS WATER SUPPLY (1867).

RETURN of the Number of Houses Erected or Rebuilt since the Year 1855, &c., showing whether every such House has been provided with a Water Closet or Privy, and how many of each; also, if a Water Closet, whether it has been provided with a suitable Water Supply, Water Supply Apparatus, and other Works necessary to secure the efficient operation thereof.

PARISHES, DISTRICTS, &c.	1. Year.	2. Number of Houses Built or Rebuilt.	3. Number of such Houses with Water Closets.	4. Number of such Houses with Privies.	5. Closets with Water Supply, &c.	6. Closets with Efficient Apparatus.	7. Closets or Privies Repaired and Improved.	8. Common Water Closets or Privies.	Remarks.
St. Leonard, Shoreditch	1856	–	All the houses erected since 1856 have proper water closets.	Not any privies* allowed since 1856.	One-half of these houses are supplied with cisterns or water-butts, with pipes to the closets, and a proper supply of water. The other half are flushed and cleansed with water daily.		The closets are kept in repair, lime-washed, &c., when necessary, under the orders of the Sanitary Committee.	*See No. 2.*	* Privies are supposed to be places with cesspools.
	1857	297							
	1858	191							
	1859	88							
	1860	163							
	1861	87							
	1862	151							
	1863	197							
	1864	74							
	1865	67							
	1866	122							
	1867	30							
Totals - -	–	1,467	1,467	–	734	734	–	–	
St. James and St. John, Clerkenwell.	1856	3	3	–	3	3	–	–	
	1857	4	4	–	4	4	–	–	
	1858	5	5	–	5	5	–	–	
	1859	16	16	–	16	16	–	–	
	1860	33	33	–	33	33	–	–	
	1861	42	42	–	42	42	–	–	
	1862	9	9	–	9	9	–	–	
	1863	9	9	–	9	9	–	–	
	1864	21	21	–	21	21	–	–	
	1865	184	184	–	184	184	–	–	
	1866	3	3	–	3	3	–	–	
	1867	3	3	–	3	3	–	–	
Totals - -	–	332	332	–	332	332	–	–	
St. Mary Abbotts, Kensington.	1856	–	–	–	–	–	–	–	
	1857	–	–	–	–	–	–	–	
	1858	–	–	–	–	–	239	–	
	1859	–	–	–	–	–	143	–	
	1860	No record to show the number of houses built or rebuilt since 1855; but no houses have been erected in the parish since 1855 without a separate water closet - - - - -					131	–	
	1861						112	–	
	1862						37	–	
	1863						45	–	
	1864	–	–	–	–	–	62	–	
	1865	–	–	–	–	–	71	–	
	1866	–	–	–	–	–	96	–	
	1867	–	–	–	–	–	1,087	–	
Totals - -	–	–	–	–	–	–	2,023	–	
St. George-in-the-East	1856	1	1	–	1	1	–	–	
	1857	11	11	–	11	11	–	–	
	1858	1	1	–	1	1	–	–	
	1859	5	5	–	5	5	–	–	
	1860	5	5	–	5	5	–	–	
	1861	6	6	–	6	6	–	–	
	1862	5	5	–	5	5	–	–	
	1863	1	1	–	3	3	–	–	
	1864	7	7	–	8	8	–	–	
	1865	6	6	–	11	11	–	–	
	1866	1	1	–	2	2	–	–	
Totals - -	–	49	49	–	58	58	–	–	

Appendix, No. 10.—RETURN of the Number of Houses Erected or Rebuilt since the Year 1855, &c.—*continued.*

PARISHES, DISTRICTS, &c.	1. Year.	2. Number of Houses Built or Rebuilt.	3. Number of such Houses with Water Closets.	4. Number of such Houses with Privies.	5. Closets with Water Supply, &c.	6. Closets with Efficient Apparatus.	7. Closets or Privies Repaired and Improved.	8. Common Water Closets or Privies.	REMARKS.
Rotherhithe - -	1856	57	43	8	440	- -	397	2	Column 5 contains the total number of closets belonging to new and old houses that have had the water laid on to them. Column 7 contains the number of old privies that have been converted into water closets by being panned, trapped, and connected by drain pipes with sewers, and also had water laid on thereto.
	1857	39	39	–	255	- -	216	–	
	1858	27	26	1	146	- -	120	–	
	1859	45	44	1	156	- -	112	–	
	1860	13	13	–	124	- -	111	–	
	1861	122	120	2	282	- -	162	–	
	1862	82	78	4	184	- -	106	–	
	1863	144	124	20	167	- -	43	–	
	1864	92	85	7	183	- -	98	–	
	1865	44	32	12	148	- -	116	–	
	1866	59	57	2	144	- -	87	–	
To March	1867								
TOTALS - -	–	718	661	57	2,229	- -	1,568	2	
Wandsworth District -	1856	–	All -	None -	Nearly all have water supplied, and efficient apparatus.		About 2,500	None.	
	1857	–							
	1858	–							
	1859	236							
	1860	274							
	1861	213							
	1862	373							
	1863	766							
	1864	874							
	1865	951							
	1866	1,035							
	1867	1,062							
TOTALS - -	–	5,784	5,784	–	- -	- -	2,500	–	
Hackney District -	1856	408	408	None	Cannot give any definite information under these headings.				
	1857	809	809	”					
	1858	299	299	”					
	1859	337	337	”					
	1860	465	465	”					
	1861	789	789	”					
	1862	785	785	”					
	1863	843	843	”					
	1864	641	641	”					
	1865	767	767	”					
	1866	518	518	”					
	1867	114	114	”					
TOTALS - -	–	6,275	6,275	–	—	—	–	–	
St. Giles's District -	1856	91 for whole.	All -	None -	158	All.	–	–	
	1857								
	1858								
	1859								
	1860								
	1861								
	1862								
	1863								
	1864								
	1865								
	1866								
TOTALS - -	–	91	91	–	158	158	–	–	

Appendix, No. 10.—Return of the Number of Houses Erected or Rebuilt since the Year 1855, &c.—*continued.*

PARISHES, DISTRICTS, &c.	1. Year.	2. Number of Houses Built or Rebuilt.	3. Number of such Houses with Water Closets.	4. Number of such Houses with Privies.	5. Closets with Water Supply, &c.	6. Closets with Efficient Apparatus.	7. Closets or Privies Repaired and Improved.	8. Common Water Closets or Privies.	Remarks.
Holborn Districts -	1856	5	5	None	5	5	–	–	
	1857	7	7	"	7	7	–	–	
	1858	9	9	"	9	9	–	–	
	1859	6	6	"	6	6	–	–	
	1860	11	11	"	11	11	–	–	
	1861	8	8	"	8	8	–	–	
	1862	9	9	"	9	9	–	–	
	1863	7	7	"	7	7	–	–	
	1864	3	3	"	3	3	–	–	
	1865	12	12	"	12	12	–	–	
	1866	10	10	"	10	10	–	–	
	1867	6	6	"	6	6	–	–	
Totals - -	–	93	93	–	93	93	–	–	
									New Closets Built.
St. Olave District -	1856	5	5	–	185	– –	34	9	27
	1857	8	8	–	507	– –	74	5	13
	1858	4	4	–	161	– –	42	4	31
	1859	6	6	–	18	– –	27	–	17
	1860	3	3	–	27	– –	22	–	8
	1861	4	4	–	39	– –	27	–	12
	1862	–	–	–	26	– –	32	2	13
	1863	–	–	–	67	– –	14	–	6
	1864	–	–	–	91	– –	66	1	4
	1865	11	11	–	35	– –	19	–	14
	1866	1	1	–	21	– –	39	1	21
	1867	–	–	–	54	– –	26	–	13
Totals - -	–	42	42	–	1,231	– –	425	22	179

St. Marylebone - - -	The Return states that the books of the Vestry do not enable this Return to be supplied.
St. George, Hanover Square -	Vestry Clerk cannot supply the information requested.
St. Matthew, Bethnal Green -	No information.
St. John, Hampstead - -	Vestry Clerk states that it is not possible to supply the particulars required.
Fulham District - - -	No information.

The following Vestries and District Boards have not up to this date made any Return, nor has the City of London.

City of London.
St. Pancras.
Lambeth.
Paddington.
Camberwell.
St. James, Westminster.
St. George-the-Martyr, Southwark.
Bermondsey.
Hamlet of Mile End Old Town.
Woolwich.
Whitechapel District.
Westminster District.
Greenwich District.
Strand District.
Limehouse District.
Poplar District.
Plumstead District.
Lewisham District.

Note.—As the Returns were not forthcoming, an attempt has been made to find the information in the Annual Reports transmitted by Vestries and District Boards to the Metropolitan Board of Works under the 198th section of the Metropolis Management Act of 1855, but as the sanitary statistics in most of these reports is so scantily stated, and so devoid of uniformity, it was found impossible to make up any satisfactory Returns; and, besides, the time was very short, and the reports, upwards of 390 in number, for the past 10 years.

Office of the Metropolitan Board of Works,
Spring Gardens, 22 June 1867.

George Vulliamy,
Architect.

Appendix, No. 10—*continued.*

FURTHER RETURN of the Number of HOUSES Erected or Rebuilt since the Year 1855, showing whether every such House has been provided with a WATER CLOSET or PRIVY, and how many of each; also, if a Water Closet, whether it has been provided with a suitable Water Supply, Water Supply Apparatus, and other Works necessary to secure the efficient operation thereof.

PARISHES, DISTRICTS, &c.	1. Year.	2. Number of Houses Built or Rebuilt.	3. Number of such Houses with Water Closets.	4. Number of such Houses with Privies.	5. Closets with Water Supply, &c.	6. Closets with Efficient Apparatus.	7. Closets or Privies Repaired and Improved.	8. Common Water Closets or Privies.	REMARKS.
St. Martin-in-the-Fields	1856	11	All	None	All	All	–	None	All houses built or rebuilt in this parish during these years have been provided with ample water closet accommodation, and every closet fitted with efficient apparatus, water supply, &c.; no privies have been permitted in new houses.
	1857	6	"	"	"	"	–	"	
	1858	6	"	"	"	"	–	"	
	1859	9	"	"	"	"	–	"	
	1860	4	"	"	"	"	–	"	
	1861	7	"	"	"	"	–	"	
	1862	5	"	"	"	"	–	"	
	1863	4	"	"	"	"	–	"	
	1864	10	"	"	"	"	–	"	
	1865	12	"	"	"	"	–	"	
	1866	6	"	"	"	"	–	"	
	1867	13	"	"	"	"	–	"	
TOTALS - -	–	93	93	–	93	93	–	–	
Chelsea - - - -	1856	16	16	None	–	16	None	None	The medical officer remarks that the 7th column must be understood to mean "closets repaired when the houses were rebuilt;" certainly hundreds have been improved, thousands, indeed, when the houses were not rebuilt.
	1857	25	25	"	7	18	"	"	
	1858	33	33	"	6	27	"	"	
	1859	39	39	"	9	30	"	"	
	1860	49	49	"	8	41	"	"	
	1861	58	58	"	5	53	"	"	
	1862	60	60	"	9	51	"	"	
	1863	78	78	"	–	78	"	"	
	1864	101	101	"	14	87	"	"	
	1865	92	92	"	6	86	"	"	
	1866	95	95	"	10	85	"	"	
	1867	89	89	"	7	82	"	"	
TOTALS - -	–	735	735	–	81	654	–	–	
St. Luke's, Middlesex -	1856	57	All	None	57	All	Repaired from time to time when required.	None	
	1857	49	"	"	49	"		"	
	1858	91	"	"	91	"		"	
	1859	116	"	"	116	"		"	
	1860	41	"	"	41	"		"	
	1861	48	"	"	48	"		"	
	1862	82	"	"	82	"		"	
	1863	90	"	"	90	"		"	
	1864	50	"	"	50	"		"	
	1865	57	"	"	57	"		"	
	1866	64	"	"	64	"		"	
	1867	5	"	"	5	"		"	
TOTALS - -	–	750	750	–	750	750	–	–	

Appendix, No. 10.—Further Return of the Number of Houses Erected or Rebuilt since the Year 1855, &c.—*continued.*

PARISHES, DISTRICTS, &c.	1. Year.	2. Number of Houses Built or Rebuilt.	3. Number of such Houses with Water Closets.	4. Number of such Houses with Privies.	5. Closets with Water Supply, &c.	6. Closets with efficient Apparatus.	7. Closets or Privies Repaired and Improved.	8. Common Water Closets or Privies.	Remarks.
St. Mary, Newington -	1856	13	13	–	13	13	–	–	
	1857	32	32	–	32	32	–	–	
	1858	16	16	–	16	16	–	–	
	1859	20	20	–	20	20	–	–	
	1860	86	86	–	86	86	–	–	
	1861	112	112	–	112	112	–	–	
	1862	15	15	–	15	15	–	–	
	1863	53	53	–	53	53	–	–	
	1864	76	76	–	76	76	–	–	
	1865	161	161	–	161	161	–	–	
	1866	96	96	–	96	96	–	–	
	1867	48	48	–	48	48	–	–	
TOTALS - -	–	728	728	–	728	728	–	–	
St. Mary, Islington -	1856	657 *	All	None	All	All	No record kept which will enable to distinguish between repairs and improvements, as above, made in old houses, and in houses erected or rebuilt since 1855; all are grouped together in the Table in use in the Sanitary Department.		* From 1 January 1856 to 25 March 1857.
	1857	471	„	„	„	„			25 March 1857 to 25 March 1858.
	1858	666	„	„	„	„			„ „ 1858–59.
	1859	763	„	„	„	„			„ „ 1859–60.
	1860	726	„	„	„	„			„ „ 1860–61.
	1861	887	„	„	„	„			„ „ 1861–62.
	1862	795	„	„	„	„			„ „ 1862–63.
	1863	795	„	„	„	„			„ „ 1863–64.
	1864	950	„	„	„	„	–	–	„ „ 1864–65.
	1865	800	„	„	„	„	–	–	„ „ 1865–66.
	1866	965	„	„	„	„	–	–	„ „ 1866–67.
	1867	–	–	–	–	–	–	–	
TOTALS - -	–	8,475	8,475	–	8,475	8,475	–	–	
					Pan Closets.				
St. Saviour, Southwark	1856	26 *	–	–	23	–	–	–	* The buildings stated in column 2, include warehouses, schools, stables, and all other buildings.
	1857	8	1	–	18	Not ascertainable.	Not ascertainable.	Not ascertainable.	
	1858	5	–	–	8				
	1859	9	–	–	7				
	1860	5	–	–	6				
	1861 1862	15	5	–	6				
	1863	32	32	–	12				
	1864	19	27	–	–				
	1865	36	66	–	–				
	1866	26	3	–	7				
	1867	17	27	–	2				
TOTALS - -	–	198	161	–	89	–	–	–	

Office of the Metropolitan Board of Works,
Spring Gardens, 2 July 1867.

George Vulliamy,
Superintending Architect.

Appendix, No. 11.

App. No. 11.

MINUTES OF EVIDENCE on the EAST LONDON WATERWORKS (THAMES SUPPLY) BILL and the EAST LONDON WATERWORKS (VARIOUS POWERS) BILL.

Tuesday, 14th May 1867.

MEMBERS PRESENT:

Mr. Ayrton.	Lord John Hay.
Mr. Sclater-Booth.	Mr. Headlam.
Mr. Benyon.	Colonel Hogg.
Mr. Henry Baillie.	Mr. Kekewich.

ACTON SMEE AYRTON, ESQ., IN THE CHAIR.

EAST LONDON WATERWORKS (THAMES SUPPLY) BILL.

Mr. *Hope Scott*, Q.C., and Mr. *Clerk* appeared as Counsel for the Promoters of the Bill.

Messrs. *Dorington & Co.* appeared as Agents.

The following Petitions against the Bill were read:

The Petition of the Vestry of St. Pancras.

No Counsel at present appeared in support of this Petition.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Fulham District Board of Works.

No Counsel at present appeared in support of this Petition.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Metropolitan and St. John's Wood Railway Company.

No Counsel at present appeared in support of this Petition.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Regent's Canal Company.

No Counsel at present appeared in support of this Petition.

Messrs. *Ellis & Ellis* appeared as Agents.

The Petition of the River Thames Conservancy.

No Counsel at present appeared in support of this Petition.

Messrs. *Wyatt & Metcalfe* appeared as Agents.

The Petition of the Vestry of Paddington.

No Counsel at present appeared in support of this Petition.

Messrs. *Toogood & Co.* appeared as Agents.

The Petition of the Metropolitan Board of Works.

Mr. *Cripps* appeared as Counsel for the Petitioners.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Vestry of Sunbury.

No Counsel appeared at present in support of this Petition.

Messrs. *Burchell & Co.* appeared as Agents.

The Petition of the Sunbury Highway Surveyors.

No Counsel at present appeared in support of this Petition.

Messrs. *Burchell & Co.* appeared as Agents.

The Petition of the Vestry of Kensington.

No Counsel at present appeared in support of this Petition.

Messrs. *Martin & Leslie* appeared as Agents.

The Petition of the Metropolitan Railway Company.

No Counsel at present appeared in support of this Petition.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of Richard Nicholson.

No Counsel at present appeared in support of this Petition.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Tottenham and Hampstead Junction Railway Company.

No Counsel at present appeared in support of this Petition.

Messrs. *Toogood & Co.* appeared as Agents.

The Petition of the Vestry of the Parish of Richmond.

No person appeared in support of this Petition.

The Petition of the Great Northern Railway Company.

No person appeared in support of this Petition.

The Petition of the London and South Western Railway Company.

No person appeared in support of this Petition.

The Petition of John Fish Pownall and others.

No person appeared in support of this Petition.

Mr. *Hope Scott* stated that the East London Water Company were exceedingly desirous that the Committee should take one of their Bills (the Various Powers Bill) before the general inquiry was gone into, as it was a matter of the greatest public importance that no time should be lost before new works were commenced in that district, within which the cholera had appeared, and which was supposed to be connected with the water supply there.

The Committee Room was cleared.

After a short time the Counsel and parties were again called in, and informed by the Chairman that the Committee had resolved to proceed with the Various Powers Bill on Monday next, and that in the meantime they would go on with the general inquiry.

EAST LONDON WATERWORKS (VARIOUS POWERS) BILL.

Mr. *Hope Scott*, Q.C., and Mr. *Clerk* appeared as Counsel for the Promoters of the Bill.

Messrs. *Dorington & Co.* appeared as Agents.

The following Petitions against the Bill were read:

The Petition of the Metropolitan Board of Works.

Mr. *Cripps* appeared as Counsel for the Petitioners.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Enfield District Local Board of Health.

No Counsel at present appeared in support of this Petition.

Messrs. *Marchant & Peed* appeared as Agents.

The Petition of the Tottenham Local Board and others.

Mr. *Rodwell*, Q.C., and Mr. *Thomas* appeared as Counsel for the Petitioners.

Messrs. *Fearon, Clabon, & Fearon*, appeared as Agents.

The Petition of Richard Hunt and Joseph Briscoe Gamman.

No Counsel at present appeared in support of this Petition.

Mr. *Henry Crase* appeared as Agent.

The Petition of Samuel Richard Bosanquet and others.

No Counsel at present appeared in support of this Petition.

Messrs. *Martin & Leslie* appeared as Agents.

The Petition of Richard Nicholson.

No Counsel at present appeared in support of this Petition.

Messrs. *Dyson & Co.* appeared as Agents.

The Petition of the Trustees of the River Lea.

No Counsel at present appeared in support of this Petition.

Messrs. *Marchant & Peed* appeared as Agents.

The Petition of the Corporation of the City of London.

No person appeared in support of this Petition.

The Petition of Charles Bradlaugh.

No person appeared in support of this Petition.

The Petition of William Delano.

No person appeared in support of this Petition.

The Petition of Richard Hunt.

No person appeared in support of this Petition.

The Petition of Phillip William Moore and W. T. H. Strange.

No person appeared in support of this Petition.

The further consideration of this Bill was adjourned till Monday, 20th of May next.

Tuesday, 21*st May* 1867.

MEMBERS PRESENT:

Mr. Ayrton.	Lord John Hay.
Mr. Henry Baillie.	Mr. Headlam.
Mr. Benyon.	Colonel Hogg.
Lord Frederick Cavendish.	Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

EAST LONDON WATERWORKS (VARIOUS POWERS) BILL.

Mr. *Hope Scott* was heard to open the case for the Bill.

Mr. Charles Greaves, sworn; Examined by Mr. *Clerk*.

Mr. *C. Greaves.* 21 May 1867.

1. You told us the other day that you had been engineer since the year 1851 of the East London Waterworks Company?—Yes.

2. And those works which were done subsequently to the year 1852 were designed by you?—They were entirely designed by me, and carried out under my superintendence.

3. The construction of the intercepting drain in the year 1853, and in the subsequent years, had the effect, had it not, of purifying the water which you took to the standard of the Enfield mill-tail?—Yes; the result of the work was very satisfactory, and elevated, so to speak, the purity of the lower portion of the river to the degree which the river had at Enfield mill-tail.

4. I think that you told us that all the sewage which entered the River Lea between that point, the Enfield mill-tail, and the place where you take your water on the right bank of the river, was by that means intercepted?—It was entirely diverted by that means. It is the sewage of a very large population; there is no sewage whatever on the other side.

5. Mr. *Henry Baillie.*] Where was it carried to?—To the lower reaches of the river below the point at which the company take out their supply.

6. Mr. *Clerk.*] Below Tottenham Mill?—Below Tottenham Mill.

7. And below there the water becomes tidal, does it not?—Not until it passes through another mill.

8. Subsequently to the Act of 1853, I believe, you purchased the Copper Mill?—Subsequently to the Act of 1853 the company purchased the Copper Mills.

9. You did that, I believe, to prevent any impurities passing from the Copper Mill into that part of the river from which you are taking your supplies?—Yes; the property, as a copper mill, had become disused, and it was desirable to prevent any other owner acquiring it; and, therefore, the company purchased it to prevent any further mischief arising, and to acquire power over the stream and the use of the fall, and the advantage of the fall, with reference to such reservoirs as they might afterwards be empowered to make.

10. And you took down the mill, I believe, altogether?—We took down all that was unnecessary. Some of the buildings remain; there is a very good water-wheel.

11. You made your filtering beds at Lea Bridge 12 acres in extent, did you not?—The filter beds at Lea Bridge were constructed 12 acres in extent, partly in the county of Essex and partly in the county of Middlesex.

12. And you had a covered conduit from those filter beds down to your pumping establishment at Old Ford?—Yes; an iron pipe was laid to convey the water.

13. You had no steam at Lea Bridge at the time the Act was passed in 1853?—No, there was no steam power, there was nothing but water power.

14. Two of the reservoirs in the neighbourhood of Old Ford were, as I think you told us the other day, covered over?—The two small reservoirs there were, as it were, made into one and covered over.

15. Those were the two reservoirs on the western side of the River Lea?—They lie on the western side, on the right bank of the river.

16. You have a plan, I think, of those reservoirs?—Yes (*producing a plan*).

17. Those two small reservoirs, as I think you described to us the other day, were thrown into one when they were covered over?—They were thrown into one.

18. One, I believe, had been constructed entirely in clay, and one in a more porous soil?—I gave that from an imperfect knowledge of them, of course, because they were made in the year 1807. I know the bottom of one is entirely clay, and the other, to a large extent, is clay; but there is a certain softness in it, from which I conclude that the borders are of a similar material, but I never dug into them to see. I have never had any reason to doubt that the reservoirs were fairly well puddled when they were made.

19. What is the extent of them?—The full water surface is two and a half acres.

20. At the bottom, of course, they are much less?—The bottoms are much smaller.

21. The partition between the two reservoirs still exists at the lower part, does it not?—It still exists at the lower part. When the water is full it stands about five feet deep, or a little more, on the portion which is removed from between the two.

22. On the eastern side of the River Lea, are there not two large uncovered reservoirs which were left there in 1853?—There are two uncovered reservoirs which were left in 1853, and they have been somewhat diminished since, having been used as a deposit for the waste soil which the company had to dispose of.

23. But all the works which you, had to do in 1853 were inspected by the Board of Trade, and were proved by them at the time?—They were inspected by three gentlemen who were sent down at the time by the Government.

24. Who were the gentlemen; do you recollect?—Mr. Ranger and Mr. Dickens.

25. They were inspectors under the Privy Council, were they not?—They were under the Home Office in some way, I believe.

26. I believe that before the works were designed in 1852, the exact point where you take your supply had not been indicated?—Before the works were designed in 1852, the company had been taking their water from below Lea Bridge Mills; and under the Act of 1850, they had acquired power to take their water immediately above the mills, but nothing further had been designed or proposed until the scheme for the Act of 1852.

27. I think that you told us that in the year 1853, you introduced a Bill into Parliament for the purpose of taking your water from Field's Weir at the junction between the Stort and the Lea?—The company did so.

28. And you were opposed by the Government on account of their factories at Waltham and Enfield, and prevented from taking your supply higher up than their works?—Yes; it was so.

29. Now, I believe that you have never obtained any further Parliamentary power, except for the purpose of raising money since the Act of 1853?—Not for any purpose, except for the raising of money, which of course goes to the general extension of the company's pipes and distribution.

30. Have the directors, and have you, with the other officers of the company, been constantly watching the quality of the water supplied?—We have with a great deal of attention.

31. And there has been, I believe, a continual chemical analysis of the water?—A continual chemical analysis of the water has been made for the purpose of keeping the company informed as to the condition and quality of the water which they were in the habit of delivering.

32. You have had a double analysis, I believe, during a great part of the time going on?—A double analysis has been taken for a great part of the time, in order to check the water capable of being delivered from the two different departments of the concern.

33. The water has been analysed both as it came from the filtering beds, and as it came from the main, has it not?—As it came from the main in a populous part of the town.

34. I believe that you have done what you could to prevent the pollution of the river?—We have done a good deal; we should have been glad to do more, but it never appeared that power sufficient existed within the compass of the company's Acts, or any other Acts.

35. Have you from time to time purchased the rights of riparian millowners to prevent the pollution of the river?—We have purchased several miles of the bed of the river and lands bordering on the river, which were capable of receiving buildings for factories. One estate in particular we had a fear was about to be built upon, and we purchased it at a very heavy expense, in order to prevent the establishment of a factory upon it.

36. I believe that until last autumn, when there was that great outbreak of cholera in the east of London, nothing had been said at all to impugn the quality of the water supplied by the East London Company?—Nothing at all; we have generally been held as delivering water quite on a par with the other companies.

37. But in the autumn of last year, public attention was a good deal directed to the quality of your water, was it not?—It was.

38. You have no power of extending the intercepting drain, I believe, beyond what was sanctioned in the year 1853?—No; there was no general power under which we could act. Nothing further can be done without new Parliamentary powers.

39. Have you also been constantly watching as to the quantity of the water as affected by the demands upon you for the supply?—Yes; the quantity of water in the river is the subject of continual guaging, and those guagings are computed and carried out into tables, and kept for my information.

40. The quantity of water delivered by you has increased very largely since 1856, has it not?—The quantity of water delivered by us has been continually increasing in a very rapid ratio.

41. From 14,500,000 gallons daily in 1856 to 19,500,000 gallons in 1866?—Nearly 19,500,000 gallons.

42. There have been some returns put in by you with regard to the increase of water supplied, and of the numher of houses supplied; have you read them?—I assisted in preparing the whole of them.

43. Are they correct?—They are all perfectly correct.

44. Was your attention called, in the year 1864, during that very dry summer, to the capacity of the river for giving any further supply of water?—It was so; but I may say that my attention then was rather particularly called to the magnitude of the river and the want of water in it. At an earlier period, as far back as 1859, I had to take it seriously into consideration, and in consequence of views which I laid before the directors of the company at that time, the idea of making storage reservoirs was accepted as one of the duties which the company had to undertake; and in consequence of that we went on with those reservoirs, which were partially completed in 1864, and at that time became of immense service.

45. Between 1859 and 1864 you had constructed some additional storage reservoirs at Walthamstow, had you not?—We had at that time 45 acres.

46. Those have been completed now, and I believe that there is an area of 110 acres?—There is an area of 110 acres, and there is in them about 220,000,000 gallons, of which the lower

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lower 50,000,000 gallons will not run off, but the 170,000,000 gallons is capable of being drawn off without any trouble.

47. The other 50,000,000 gallons would require to be pumped?—The other 50,000,000 gallons would require to be pumped.

48. *Chairman.*] What is the depth of the reservoirs?—From 10 to 11 feet.

49. Mr. *Clerk.*] Forty-five acres I understand was available for you in the year 1864?—Forty-five acres was available in the year 1864.

50. And that enabled you to supplement the supply during that very dry summer?—It did.

51. But have you since had under your consideration the necessity of further enlarging your storage area in that neighbourhood?—I have. I have attentively and closely considered it, and I think that the wisest thing that we can possibly do is to have as large a body of water in hand available, close to us, as we can acquire.

52. The 110 acres were purchased, I believe, by agreement without Parliamentary authority?—They were purchased. The estates were in the market and the land was purchased.

53. You are unable, I believe, to purchase any more land there, by agreement, and require Parliamentary authority?—The adjoining estates, which are suitable, are in trust or under some disability as to sale, which we cannot get over without Parliamentary power.

54. I believe you have had under consideration every mode by which you could increase the supply of water to your works at Lea Bridge?—I think so. I do not think there is any possible plan available for the improvement of waterworks in any way but what I have considered or have had under my notice.

55. You have considered, I believe, the feasibility of going to the river Ouse for an additional supply?—Yes, I have; and I have carried out a large survey to see whether it was possible to get water from the Ouse, or whether it was advisable water to bring.

56. Is the quality bad?—Certainly it is not bad, but it is inferior to the Thames.

57. And it would be a very expensive mode of bringing the water, would it not;—The distance is very great. I could not get to the Ouse under 48 miles, and I could not get it over a lower summit than 350 feet, and only that by tunnelling a considerable distance.

58. I believe you have tried the chalk in the neighbourhood of Walthamstow?—I have made a bore into the chalk to see if the chalk was prolific in water. I sunk a well and carried a 12-inch bore down to a great depth within the area of the reservoir property, but I found the supply from the bore was but moderate, and not sufficient to give one any hopes of a larger supply.

59. Did you get as much as a million gallons a-day?—No; it was under half a million gallons.

60. That would leave you without much expectation of getting a large supply from the chalk there?—It does.

61. Of course the Committee are aware that you have a scheme still before Parliament of obtaining an additional quantity from the Thames?—I believe the Committee have that before them.

62. I believe you have found no difficulty in filling those reservoirs which you constructed at Walthamstow between the years 1859 and 1864?—Between the years 1859 and 1864 there was no difficulty in filling them.

63. Does it appear therefore to you that the first work to be done, and that which is of the most pressing necessity, is to construct, if possible, additional storage reservoirs in that neighbourhood?—It is the wisest thing to do.

64. It would be the earliest thing that you could do, would it not?—Yes; it would be the work that would be the most rapidly carried out and most speedily concluded.

65. You could conclude it in a very short time after obtaining Parliamentary authority to get the land?—Yes.

66. What additional storage area do you propose by this Bill to obtain?—We shall add some 300,000,000 gallons or more to the quantity which we are at present able to hold.

67. Then you would, in fact, at Walthamstow, have more than 500,000,000 gallons?—Yes; I think we may safely say that we should have more than 500,000,000 gallons.

68. What is the area of the additional storage reservoirs?—One hundred acres of water.

69. And I believe you propose to construct those of a greater depth than the existing reservoirs of 110 acres?—Yes, I propose to fill them to a greater depth than the existing reservoirs, and also to fill a portion of the existing reservoirs to a greater depth than they are now filled: so that under the new section of the work, I credit myself with rather a larger quantity than I get from the old work.

70. The works which you propose to construct in this Bill are those contained in Clause 6, A, B, C, D, E, and F, down to, I think, O. They are all marked I believe on the plan which the Committee have before them, with the same letters?—Yes; the letters are at the bottom.

71. The works A and B refer to some additional filtering beds, do they not, near Lea Bridge?—Yes; the works A and B are additional filtering beds adjoining the present establishment of filtering beds at Lea Bridge.

72. Those are entirely unopposed, are they not?—Those are entirely unopposed.

73. Now D is a reservoir and filtering beds, on lands in the parish of Walthamstow, adjoining the southern side of Copper Mill-lane?—Yes; they lie on the southern side of the already constructed reservoirs.

74. And C is a reservoir, pumping station, and conduits, and other works made or partly made by the company in the parish of Walthamstow, at or near to buildings and property called the Copper Mill?—Those are buildings already constructed.

75. It is to give Parliamentary sanction to those works?—Yes, it is to give Parliamentary sanction to those works; C is already completed.

76. Then D is "A reservoir or reservoirs and filtering beds, on lands in the parish of Walthamstow, adjoining to the southern side of Copper Mill-lane." And E is "A reservoir or reservoirs and filtering beds, wholly in the parish of Walthamstow, on lands adjoining or near to the northern side of Ferry-lane"?—Those are the reservoirs coloured red on the plan on the northern side of the existing works.

77. I may take it that that is a work with regard to which there is some opposition on the part of a gentleman named Bosanquet, may I not?—

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not?—There is; the stream to which that applies passes through that property.

78. Now F is a conduit connecting one reservoir with the other?—Yes; there are several letters referring to conduits which are essential to the works.

79. I think G, H, I, J, M, and N, are all conduits?—Yes, they are all conduits for filling one reservoir from the other across existing roads.

80. You are not aware that there is any objection raised by anybody to any of those works?—There is no objection whatever to any of those works.

81. Now, then, N is "A conduit or aqueduct commencing in the parish of Walthamstow to the eastward of 'France Weir,' in or near to the northern extremity of the reservoir or reservoirs, and filtering beds, and terminating in the parish of Chingford, in the county of Essex." By that conduit do you propose to take the water from above Chingford Mill, and to carry it down by France Weir into one of the new reservoirs?—It is proposed to bring the water from Chingford Mill-head by that conduit into one of the now intended reservoirs.

82. That is a matter, I believe, with regard to which there is some opposition before the Committee on the part of the River Lea Trustees as the owners of Chingford Mill, and on the part of Mr. Hunt, the lessee of the mill?—It is so.

83. *Chairman.*] Under what head is that described in the Bill?—Under letter N.

84. Mr. *Clerk.*] Therefore I may take it that as far as we know of these works which you propose to construct, the only one which is opposed is reservoir E, which is opposed by Mr. Bosanquet, and this Chingford conduit is opposed by the River Lea Trustees as lessors, and by Mr. Hunt as the lessee of Chingford Mill.

> Mr. *Pecuber* stated that the Bill was also opposed by the River Lea Trustees as guardians of the navigation.

85. Mr. *Clerk* (to the *Witness*).] Clause O is, "Cleansing, scouring, deepening, widening, protecting and preserving of the River Lea, from a pointn orthwards of Flanders' Weir to the 'Ferry Boat' Inn, in the parish of Walthamstow, and which portion of the River Lea is in the parishes of Chingford, and Walthamstow, and Edmonton, and Tottenham, in the county of Middlesex, or some of them." That I believe is unopposed?—That is unopposed.

86. Is the situation in which you propose to place those reservoirs a good one for storing water?—Yes, a very good one; it is unobjectionable on every ground that I know of.

87. Is it out of the line of floods?—It is well on one side of the line of floods, and it is not liable to injury of that kind at all.

88. And is it pretty well removed from London atmospheric influences?—Yes; quite sufficiently far. We find very little deposit from the atmosphere of any kind as far away as that.

89. I believe that there is no increase of population on that side?—The increase of population of Walthamstow is very slow, indeed I am not sure that it increases at all.

90. The land lies very low, does it not?—It varies; but Walthamstow is no great thoroughfare. In the neighbourhood of the works the land is low; the land there is in the flat of the valley.

91. Will the water in those reservoirs become stagnant?—Not at all. I do not think there is any fear of stagnation.

92. Will there be a constant circulation through that reservoir E?—On the principle on which I should work them, I should maintain the circulation as much as possible. We at present maintain complete circulation in what we have, and there would be no difficulty in extending that circulation to the whole.

93. The storage reservoirs is the work which you have first in view, of course; but have you also in contemplation additional filter-beds in this neighbourhood at Walthamstow?—Possibly it may be one of the works which may devolve upon us hereafter, but at present I do not contemplate the construction of filter-beds there.

94. But you would have the means, would you not, of having additional filter-beds here, and also, possibly, the power of pumping from this point?—We justify the construction of filter-beds by saying that we take the power to construct the filter-beds, but it is not exactly at present intended.

95. I believe that the principal landowner in that neighbourhood is Lord Maynard?—Lord Maynard is the owner of all the land on the northern side of Ferryboat-lane, except one field.

96. I do not know whether there is a Lord Maynard now, but I believe that the trustees are not opposed to your scheme?—They are not opposed to the scheme.

97. As regards the opposition to this part of the scheme, Mr. Bosanquet is a landowner, I believe, at a short distance from your works, is he not?—He is a considerable landowner of adjoining land.

98. *Chairman.*] Will you point out where the farmhouse and moat are of which you have spoken, and the conduit also?—The conduit which leads down to that is the main drain (*describing the same to the Committee on the Plan*). The farm stands there, with a square moat round it, and the conduit by which the water comes down to it is a public drain of the company. The issue mill-head which supplements the conduit is a simple channel across there.

99. Mr. *Clerk.*] Now you have seen the petition of Mr. Bosanquet, and the allegations, I believe?—I have read the petition.

100. I see that Mr. Bosanquet alleges, "That the lands and properties belonging to and occupied by your petitioners have from time immemorial been supplied with water from the River Lea by means of a sluice under the control of your petitioners, situate on the Copper Mill Stream, and called or known as Barup Still Sluice. The waters so derived, besides being used for irrigation and the usual farm and domestic purposes, for which they form the only means of supply available to your petitioners, are also used for supplying with a current of fresh water a moat which surrounds an ancient farmhouse belonging to your petitioner, the said Samuel Richard Bosanquet, and occupied by your petitioner, the said Henry Boston, junior, and which moat forms a feature of interest and picturesque beauty to which your said petitioners attach great value." Now this sluice is in the Copper Mill Stream, is it not?—Yes, the sluice is in the bank of the Copper Mill Stream, on the eastern side.

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101. On the lands, I believe, of a tenant of Lord Maynard?—On the property of the late Lord Maynard, which is now occupied, of course, by a tenant of the trustees.

102. And I believe that these tenants from time to time let off the water from the Copper Mill Sluice for the purpose of irrigating their land?—That is the legal form, I believe, in which the water is drawn at that sluice.

103. Do they do it themselves, or do they apply to you or your officers to get it done?—We have been asked to let the water out occasionally, and we have done it, but I cannot exactly state by whom the application has been made. I should imagine that Lord Maynard's tenants never think of asking us, because I should think they do it under the right which we acknowledge, and which we considered to be the only right existing in that sluice.

104. Mr. *Henry James.*] What right is that?—To irrigate and water their lands.

105. Mr. *Clerk.*] I believe that you have seen some very old grants to Charles Maynard the elder, and Charles Maynard the younger, of the date of 1659?—I have. Those deeds are in the possession of Lord Maynard's trustees.

106. When the water has been so let out to irrigate those lands of the tenants of Lord Maynard, it flows down to some drain, does it not?—It finds its way into the public carrier of the country, and it flows down that to beyond the lower landowners.

107. And if the tenants of my Lord Maynard, in the exercise of their right, let out the water from the Copper Mill Stream, it would flow down the ordinary watercourse, would it not, in the direction of Mr. Bosanquet's property?—Yes, it flows through his property.

108. And it is a land drain, is it not, receiving the sewage of the neighbourhood?—Receiving all the sewage of the neighbourhood; and, in fact, becoming excessively foul with the sewage of the neighbourhood.

109. But it becomes a picturesque feature, in Mr. Bosanquet's opinion, about this house, does it not?—It is a question of opinion, of course, whether a broad black ditch is a feature of interest.

110. I presume that the East London Waterworks Company do not know how the right may be, whether Mr. Bosanquet has any right here or not?—I do not know how we are to determine anything further; I have always believed that the right was a right only in the hands of Lord Maynard's representatives or tenants.

111. If it be a right, it will be one which will be a matter of compensation, either in water, or in money?—In money I should say.

> The *Chairman* directed the attention of the learned counsel to the allegation in the petition, that the withdrawal of this water from the petitioners is not essential for the objects professed by the Bill, which can be equally well effected, without interfering with the rights of the petitioners.

112. Mr. *Clerk* (to the *Witness*).] Will you be so good to explain how it is that any water which is now used by Lord Maynard's tenants will be prevented, after your works are constructed, from being taken through this sluice?—It is perfectly clear, that, if we stop up the sluice.

113. Why do you stop up the sluice?—To retain the water; we want to retain all the water; of course the water from that sluice does not return again to the water which we use, it flows into a public drain, and becomes polluted, and passes below the levels which we have any action upon; we appropriate the water by blocking up the sluice.

114. If there is any right existing in Mr. Bosanquet to have this water flow on to his land after it has been used by the other tenants of Lord Maynard, that would be met by money compensation, would it not?—I should think that it could; I do not see any difficulty in compensating him if he has any right.

115. His right I believe has been disputed.

> The *Chairman* stated that it was unnecessary to go into these points as the allegation to which he had already called attention was the only objection to the preamble of the Bill.

116. Mr. *Clerk* (to the *Witness*).] Is it necessary for you that you should have all the water which you can get for the purpose of filling your reservoir?—I think it is, I do not at all see why this water should be left to run into a sewer, and become polluted.

117. Are those who have the right to let off this water, viz., the tenants on Lord Maynard's estate satisfied with what is proposed to be done?—We had no objection from them.

118. Now, then, the other work which is opposed is the making of that conduit from Chingford Mill Lead down to your reservoir E, is it not?—It is.

119. I am afraid I must go into a little detail as to the position of the East London Water Company with reference to their rights in the waters of the River Lea; I believe that under an Act of 1855 the whole of the waters of the River Lea ——

> The *Chairman* intimated that it would be better for the learned counsel to state to the Committee the effect of the Acts, than to take evidence upon this point from an engineer.
>
> Mr. *Clerk* read, and commented upon Section 9 in the Act of 1855, and Section 68 in the Act of 1850, and also Sections 11, 20, 23, 30, 59, 60, and 62 in the Act of 1855.

120. Mr. *Clerk* (to the *Witness*).] There were agreements entered into, I believe, subsequently for the carrying out of those clauses?—There were, I believe.

121. Now practically, will the water which will be taken into this reservoir E from the Mill Lead above Chingford Mill be flood water?—That is the intention under the language of the Act, to take flood water from that channel into the reservoir So far as any additional power is given by the Act it will be so.

122. But the other company who are jointly interested with yourselves in all the water, except that which is required for keeping up the navigation, can give their consent to your taking more than the flood water?—Yes, they can; the other company consenting, water may be taken from the ordinary running river from the mill.

123. Then, so far as the trustees of Mr. Hunt are concerned, as a matter of fact, will you take any water other than that which you have a right to take with the concurrence and consent of

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of the New River Corporation?—No more than we have a right to take with the consent of the New River.

124. Supposing that at the present time the New River were to give their consent to your taking a quantity in excess of the flood water, would you take it at the present time?—Not at the present time without destroying the value of the mill, which we are not at liberty to do.

125. You would require an additional work in order to get at it?—We should require an additional work in order to get at it; but we can take the water in the terms of the Act as a right; but we have not the works whereby to take it.

126. You could take the water, so that in fact you might take the water, and so render Chingford Mill valueless?—We might.

127. You never exercised the power which was conferred upon you in 1855, of purchasing the Chingford Mill, did you?—We ought to have done so, but we did not.

128. And now I believe you propose to buy Chingford Mill?—We propose to revive that power, and on that to buy the mill.

129. Instead of depriving the mill of its water, as you say you could do, you propose to give them compensation by purchasing the mill?—We propose to purchase the mill and the buildings and the property of the mill.

130. The River Lea trustees are the lessors of the mill, are they not?—They are the freeholders.

131. To Mr. Richard Hunt?—To Mr. Richard Hunt.

> Mr. *Johnson* objected to that; if the lease were to be referred to, it must be put in.
>
> Mr. *Clerk* stated that he had the draft of the lease.
>
> Mr. *Johnson* stated that he would not insist upon rigid proof, if a counterpart of the lease were produced.

132. Mr. *Clerk* (to the *Witness*).] I believe that the draft of the lease was, in your presence, read over, or certain clauses were read over to the tenant of the mill, Mr. Hunt?—It was in the presence of Mr. Hunt with his solicitor.

133. *Chairman.*] What is the date of the lease?—1854.

134. Mr. *Clerk.*] In fact is was just before the Act of 1855?—It was before the Act of 1855.

135. The term is from the 24th of June 1854, for 28 years?—Yes.

136. There is a clause, I believe, in this lease enabling the tenant to throw up the lease if the trustees exercise their power of selling the water, or if the water is taken away from him?—There is in the latter part of the lease.

> Mr. *Johnson* stated that the lease recited that there were disputes between the Water Companies and the River Lea Trustees, and that those disputes must be settled; and that if, after those disputes were settled, the quantity of water taken should be reduced by one-seventh, then it should be at the option of the lessee to throw up his lease; and that there were also other clauses.

137. Mr. *Clerk* (to the *Witness*).] These disputes were, of course, in existence in 1854, and the Act of 1855 was passed for the purpose of putting an end to disputes between the New River Company and the River Lea Trustees; that was so, was it not?—It was so.

138. The clause to which my learned friend refers in the lease is this:—

> "Whereas there are disputes existing between the said Trustees of the River Lea and the New River Company respecting the amount or quantity of water which the said New River Company are entitled to abstract from the River Lea above Chingford Mill, and similar disputes may arise with other companies; the said Trustees of the River Lea have powers to take, sell, and dispose of the surplus waters of the said river to water companies and other persons, and to construct works for the benefit of the navigation; and arrangements may hereafter be entered into between the said Trustees and such companies or other persons for the execution of works, and also for the abstraction of the water from the said river above the mills and premises hereby demised. And whereas by means of the exercise by such Trustees of such powers of selling and disposing of surplus water the said Trustees may reduce or be instrumental in reducing the water power of the said mill, or such water power may be or become reduced by means of a settlement of the said disputes with the said New River Company, either by agreement between the said Trustees and the said New River Company or by a legal decision in favour of the same or any other company. It is hereby expressly agreed by them the said parties to these presents that the said Trustees of the River Lea shall and may enter into agreements with the said New River Company or any other water companies or other persons or parties for the abstraction of the waters of the said river above the said mill and premises; and the Trustees may themselves abstract any such surplus waters by cuts, canals, borings or wells, or in any other manner without any claim for compensation on the part of the said Richard Hunt, his executors, administrators or assigns, or interference by him or them in any arrangement which may be entered into by the said Trustees and any water companies or other persons or parties during the continuance of this demise; nor shall the said Richard Hunt claim or be entitled to any compensation in case of a legal decision that the said New River Company or any other company are or shall be entitled to abstract an additional or increased amount or quantity of water above Chingford Mill: Provided always, that if at any time during the continuance of this demise the said Trustees or the said New River Company or any water company, or other persons or parties under any arrangement as aforesaid, or under any legal decision as aforesaid, shall so abstract the water from above the said mill as to lower or reduce the fall or power due to the said mill at the date of the execution of these presents (such power being ascertained in manner prescribed by the River Lea Improvement Act, 1850, and stated in the report of the engineers, dated the 14th May 1853, deposited with the Clerks of the Peace as required

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quired by the said Act) beyond the amount of one-seventh of such power, the said Richard Hunt, his executors, administrators or assigns shall have full liberty to throw up this lease on giving six months' written notice."

Mr. *Clerk.*] That was in 1854; subsequently to this agreement containing the power of throwing up this lease if the water should be abstracted, this arrangement was come to, was it not, in 1855, between the River Lea on the one hand and the New River and the East London Water Company on the other?

Witness.] It was so; the River Lea Trustees having reserved the right to take the water from the mill when they sold the water, did sell the water, and consequently took away the water above the mill.

139. And I believe that the consideration was the giving of a very largely increased payment to the River Lea navigation?—Yes; it was annuity which the Company agreed to pay to the Trustees in consideration of that among other things.

140. Supposing that you, in dealing with the trustees, had bought their rights as trustees, but did not touch their rights as mill-owners, would you have got anything in consideration of what you gave them?—No.

> The *Chairman* stated that the Committee could not decide the questions of right which were raised upon the construction of the Act and of the lease, and that the only question to be raised before the Committee was whether the water could be as well drawn from the tail of the mill as from the head of the mill.

> Mr. *Clerk* stated that the Lands Clauses Act was incorporated in the Bill, and that any right which Mr. Hunt had under his lease would be reserved to him.

141. Mr. *Clerk* (to the *Witness*).] I will ask you, as the engineer to the scheme, why it is that it has become necessary for you to take this supply of water from above Chingford mill?—My object in taking the water above the mill is that I may have the fall of the mill as a part of my reservoir depth. The reservoirs are arranged to be filled up at the level of the mill.

142. *Chairman.*] What is the difference of level between the head and the tail of the mill in the ordinary state of things?—I should think about seven feet.

143. Can you get seven feet by drawing from the head instead of the tail?—Yes.

144. Mr. *Clerk.*] Your reservoir, I understand, is to be 100 acres?—It is.

145. Are you enabled to raise the size of your reservoir, so as to get a much larger capacity by doing so?—I raise the level of the reservoir banks to retain that greater quantity of water.

146. *Chairman.*] You get out seven feet above the level of the ground on which you propose to make the reservoir?—Yes; there is a further fall between the tail of the mill and the next mill below, which is lossed in the friction of the river.

147. Mr. *Clerk.*] Do you contemplate buying up the mill, and getting rid of the mill?—That must follow according as circumstances turn out. I propose to take the water under the right which the freeholder has now, which right I propose to buy. I propose to take the water from the head of the mill. If the mill is damaged, there is the lease, which is a very proper one. The whole of this was considered, and it was all thoroughly provided for before this lease was entered upon, and now we are going to fructify what was then intended.

148. And whatever rights Mr. Hunt may have under that lease, he will be compensated for under the Lands Clauses Act?—He will be compensated, but the rent which he pays for the mill was adjusted, in consideration of what might occur.

> The *Chairman* stated that the clause which Mr. Clerk had read was full of complications which the Committee were not called upon to decide, and that Mr. Hunt's right was reserved in the Act of Clause 10.

149. Mr. *Clerk* (to the *Witness*).] As a matter of supply, do you consider it, as an engineer, for the reasons which you have given, necessary for you to take the supply from Chingford mill head, and not from the tail?—It is necessary.

150. Would your reservoir be very much less effectual, if you took it from the tail?—The loss of not being able to fill up to the higher level would be a very great loss.

151. Now there is one other point?—It was part of your scheme last autumn, I believe, to have extended your intercepting drain in various directions?—It was.

152. That was opposed, I believe, by different parishes, Enfield and Tottenham, and so on; and it was also petitioned against by the Metropolitan Board of Works; they are the only parties appearing upon that point now, so I call your attention to what they say. I see that they say in their petition, "That the works proposed in the Bill are defective in their engineering details, and will not be efficient for their proposed object:" "That the works contemplated by the said Bill are not, your petitioners submit, sufficient to purify the water of the River Lea within the metropolis; and that, to be effective, they should be of a more comprehensive character." I believe that you have seen a report of their engineer, Mr. Bazalgette, to that effect?—Yes; I have seen Mr. Bazalgette's report.

153. This is the passage, I believe, to which I refer: "The sewers or drains to be built under this Bill, at the nearest point, will be about five miles beyond the jurisdiction of this Board." In consequence of this report of Mr. Bazalgette's, and also of the opposition of other parties, and the report of the Rivers Pollution Commission, you struck out all those powers of making additional intercepting drains, did you not?—Yes; we have struck out the powers, because they would interfere with the more comprehensive schemes which are advised by the Rivers Pollution Commission, and which are recommended by Mr. Bazalgette himself, in his own report to the Metropolitan Board of Works.

154. I believe that when those powers had been struck out of the Bill, notice was given to the Metropolitan Board of Works that that was the case?—It was.

155. I see that your company have received a letter from the Metropolitan Board of Works, signed by their solicitor, dated the 20th May, which my learned friend Mr. Hope Scott has already read: "The Committee of the Board has to day again considered this Bill, with the various amendments and alterations which you propose to make. The feeling is very strong that the ad-

vantages which were held out for Parliament giving the powers ought not to be withdrawn, and that as the neighbourhood would benefit by the works now to be withdrawn, the Board decline to withdraw their petition, as they must submit that the works ought to be carried out if the other powers are to be given; but that if the old clauses are not restored the Bill ought not to pass." Now there is one other matter which you propose to do, I believe, and for which some additional clauses have been inserted, and are now before the Committee; that is, for an alteration of the works at Old Ford?—There are additional works and an alteration of the old works at Old Ford.

156. Those were described to the Committee the other day, and you handed in a plan showing how you would deal with those matters?—Yes.

157. *Chairman.*] The evidence which you gave to the Committee with reference to your works, when you appeared before them on a former occasion, is correct?—It is perfectly correct, and it explains the present case.

158. Mr. *Clerk.*] You gave evidence, also, the other day as to the quantity of pumping power which you have at Lea Bridge and at Old Ford, did you not?—Yes.

159. And was that correct? — That was correct.

160. And you are now putting up additional engines and pumping power at Lea Bridge?—I am now erecting engine power at Lea Bridge, and laying additional main pipes to carry the water which those additional engines will pump into London.

161. What is the estimate for the works which you propose to retain in the Bill?—The estimate as it now stands is 160,000 *l.*

162. And that will give you an additional available supply of 300,000,000 gallons?—An additional available supply of 300,000,000 gallons or more.

163. And additional filtering beds?—Additional filtering beds, and certain other subordinate works.

Cross-examined by Mr. *Cripps.*

164. May I assume that you were the adviser of the East London Waterworks Company in the scheme which they are proposing here?—Yes.

165. And it was a part of the scheme which you proposed to Parliament, that there should be intercepting sewers to aid in the purification of the River Lea?—Yes.

166. For the purpose of enabling you to supply purer water where you drew your source of supply?—Quite so.

167. And you thought that these intercepting sewers were a valuable part of your work?—Yes.

168. You have, in point of fact, at a former time, put in some intercepting sewers up to a certain height in the stream?—Yes.

169. And you have found the good effects of that?—Yes.

170. Are you aware that the Metropolitan Board of Works objected that your intercepting sewer was not sufficiently extensive for its purpose?—Yes; I think that is the form of their objection.

171. Let me ask you one general question; did you really suppose that it could be satisfactory to the parties who suggested that that sewer was not sufficient for its purpose to say, "Then we will do nothing at all?"—Not at all.

172. But that is what you have done, is it not?—Not at all. The pressure of circumstances induces us to withdraw the application for power to make those drains, because that power will evidently be conflicting with some other powers which are soon to be created.

173. Whatever the cause was, you were told that they were not sufficient for the purpose, and thereupon you withdrew them altogether?—We could not make them more comprehensive.

174. And then you expected that those who objected that they were not even sufficient would be satisfied when nothing at all of the kind was to be done?—It is for the Committee to consider how the condition of things stands. I do not see that we could do any otherwise than we have done.

175. But at the present time you, advising the East London Water Company, thought that these intercepting sewers were an essential part of your scheme to supply pure water, and they are now struck out of your Bill?—They are, but the company do not run away; they are there to make other works if they are necessary.

176. Your object by this Bill is to take a greater quantity from the river, is it not?—We shall impound water.

177. How far at the present moment does the intercepting sewer extend; does it end at the Enfield Mill?—A few hundred yards beyond Enfield Mill. It is carried beyond the Enfield Mill sufficiently far to intercept the drainage of a small district above the mill.

178. Then, excepting so far as the Enfield Mill goes, there is nothing at the present time to prevent the sewage of all the towns that are above that part of the Lea from coming to the Lea?—Except so far as a little above Enfield Mill is concerned, there is nothing to prevent the sewage of all the towns above that part of the Lea from coming into the Lea.

179. How far is it essential to your present scheme that that intercepting sewer should be carried up to intercept the drainage?—As far as the town of Waltham Abbey on one side, and up to the neighbourhood of Waltham Cross on the other side.

180. That was essentially a part of your entire plan as proposed?—Yes; part of the plan.

181. Now, let me ask you this; assuming that your scheme was good, as far as it goes, with regard to the state of the river above, how many miles in the first instance is it from where your intercepting sewer terminates at present up to Luton?—I think it is 36 miles.

182. And taking the other branch, how far is it from the junction to Bishops Stortford?—From the point at which we take the water out of the river, which is three miles below Enfield Mill, is 25 miles to Bishops Stortford and 36 miles to Luton.

183. That intercepting sewer would have no effect beyond the point to which it is carried, of course?—Not at all.

184. Now, just let me call your attention, and through you the attention of the Committee to what is left; is Luton a town of 20,000 inhabitants?—Yes; there is that population in the circumjacent parishes.

185. Does the whole of the drainage of Luton drain to the Lea?—I believe so, so far as it drains anywhere.

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186. So far as it drains anywhere, it must drain into the River Lea, must it not?—All country towns do not drain; there is a very partial drainage.

187. But is there not a drainage system at Luton, and does not that drainage system get taken to the Lea?—It does.

188. Did you know that there was some attempt at clarifying the sewage there?—Yes; I believe there is a system of purifying very carefully carried out. I have heard it generally spoken of as a very well managed works.

189. That process improves it as far as the solids are concerned, but allows the fluid to remain sewage, and if allowed to stagnate it would become putrid and offensive?—Yes.

190. Passing a little lower, you come to the town of Hatfield?—Yes.

191. Is that a town of 4,300 inhabitants?—I believe it is somewhere about that.

192. And does not the whole of the sewage of that town come to the Lea?—I believe not at all. I believe the sewage of Hatfield is carried into special system of "dumb-wells," by which the sewage is not allowed to go into the river at all.

193. Is this the fact, that "The plan for the disposal of the sewage was adopted with a view to its complete exclusion from the river; but it is essentially a 'dumb-well' system, and the effect must be more or less to pollute the sub-soil water which, after passing through the chalk or gravel, subsequently finds its way to the river"?—It is rather an uncertain view to take.

194. Coming further down the same branch, there are a number of villages and houses situate immediately on the stream, are there not, all of them more or less polluting the river below Hatfield?—There are not many between Hatfield and Hertford.

195. Do you know Whitwell?—That is not the Lea.

196. Is it not on one of the tributaries of the Lea?—It is on the Mimram.

197. Is this true: "Whitwell is a place where privies hang over the water, and in Welnyn the whole of the sewage runs in. To a certain extent also the river is polluted by sheep-washing, which is carried on upon a large scale. The preparation used for dipping sheep contains arsenic;" and so they go on to speak of that?—They are within the truth, of course. They are all fair descriptions.

198. Now, taking the district above Hertford, will you tell me what the whole population is. Is this correct which states that it is something like a population of 73,000 persons?—I make it rather less; but it is somewhere thereabouts, no doubt.

199. Mr. *Benyon.*] Does the sewage of 73,000 people drain into the River Lea above Hertford? —I must except to that. The 73,000 people is the whole rural population away to the outer watershed of the valley.

200. Mr. *Cripps.*] I am putting to you distinctly the upper district, that is to say, the district above Hertford; does not that contain 73,000 persons?—That is the whole population of the watershed, not of the towns. That includes the whole population out to the watershed line, the opposite side of which watershed line runs away to the Ouze and the Colne.

Mr. *Henry Baillie* inquired whether there was any complaint as to the purity of the water where it starts from the New River at Hertford.

Mr. *Cripps* stated that the Commissioners' Report distinctly showed that it was not pure.

201. Mr. *Cripps.*] Now let us take what I will call the middle district, from Hertford down to Ponders End; that would be above where you draw from, would it not?—It would.

202. So that anything relating to that part of the river, relates to a place above your source of supply?—Yes.

203. The population of Hertford itself, is about 7,000, is it not?—About that.

204. The town of Hertford has a complete system of drainage, has it not?—It has; very thoroughly carried out.

205. And the sewage flows into tanks about a mile below the town on a marsh, does it not? —Yes, on King's Mead.

206. Is this true:

> "On approaching these works, we feel at once that we are in a region abounding in night-soil, and an examination of the tanks displays a vast quantity of human ordure. The sewage is here filtered, and the liquid flows by a channel constructed for the purpose into the river at a distance of about 1,000 yards."

Is that the case at Hertford?—It is the case; except so far as the works are inclosed within a very high bank. I never smelt the sewage anywhere outside the bank; a man must have a very long nose to smell it.

207. The fact may be so, but the effect upon people's noses must be different, I suppose. Now then we come lower down, and settle upon that part of the stream at the town of Ware; is that a town of 6,000 inhabitants?—I believe it is. I have gone into the populations of all those towns, and I suppose you are right in the figures you quote.

208. Is it the fact that "upwards of 220 water-closets, as well as household drainage," are discharged into its sewers?—The general drainage of the town of Ware passes into the Lea, but the number of closets or cess-pools, I have no means of knowing. I imagine the Commissioners have inquired properly into it.

209. Is this fact true: "This sewage" (speaking of household water-closets), "without any lining or other sort of treatment, is passed direct into the river by several outlets, an arrangement which tends to diminish the local nuisance, but does not diminish the total amount of pollution caused to the river"?—Yes; that is the case.

210. When you get down below Ware, the River Stort comes in, does it not?—Some distance below.

211. The principal town on the Stort is Bishops Stortford?—It is the most populous place on the River Stort.

212. Is that a town of 5,000 inhabitants?—Yes.

213. Is this the fact there? "Drains are general throughout this town, though main-sewers have not been laid down on any proper system: these drains receive and discharge into the river the sewage refuse of the streets, houses, and other places, as also the contents of upwards of 300

water-closets?"—Yes, I should think that is true; I have visited Stortford many times.

214. Is this also true from another report with reference to Bishops Stortford: "Arriving at the lower end of this town, the sight I witnessed was sickening. The river was covered by large masses of black filth, which, I believe, is only to be found in open sewers. It is generated at the bottom, and when a certain period of its growth is reached, it appears to obtain greater buoyancy, its hold upon the mud is relaxed and it rises to the surface. The whole town, a very considerable one, is drained directly into the river. Long rows of privies overhang the banks; huge masses of excrement, in many cases not less than half a ton are sliding into the water, the lower part being washed away, and the weight above constantly pressing down that below, to become mingled with the water. I do not at all exaggerate when I say that the water in the river is quite as bad, or really worse than that in the high level sewer which drains the northern portion of London." That refers to Bishops Stortford; what do you say to that?—No doubt the sewage of Bishops Stortford is very deleterious to the river. I think the water in the neighbourhood of Bishops Stortford is worse than it is anywhere else. It is a town which requires more to be dealt with than any one of the whole series of the River Lea system.

215. If you do not dispute it, I need not multiply reports, otherwise I have another report made as to the district works of the Poplar district by a committee appointed, and signed by the chairman there, which substantially gives the same statements, but you do not dispute the general effect of such a statement?—I do not dispute the pollution of the water in the neighbourhood of Stortford.

216. Now, taking the second division of the river, from Hertford to the place where the intake of your stream is at Ponders End, would that comprise a population of 79,000 persons?—I do not think it is so much, but it is not very much below it.

217. Taking it somewhere thereabouts, it is upwards of 70,000?—I do not think it is so much as 65,000, but I am not positive.

218. Mr. *Kekewich.*] Is the highest intake up the river at Ponders End?—The river is purified beyond Ponders End, it is equivalent to its being there; the water is purified from there downwards by the diversion of the sewage.

219. Mr. *Cripps.*] Is Ponders End your highest intake up the river?—I was just saying that from Ponders End downwards all the sewage is diverted, but the intake is not locally there.

220. *Chairman.*] The intake is at Tottenham, and the intercepting sewer goes up as high as Ponders End?—Yes.

221. Mr. *Cripps.*] At any rate the water that you get is below all those places which I have mentioned, you have no intake higher up than Ponders End, have you?—We have no intake higher up than Ponders End.

222. The only difference that comes in at Ponders End is, that your intercepting sewer comes up to there?—Yes.

223. But where you take the water from is considerably lower than Ponders End?—The local site of the intake is three miles lower down.

224. Therefore your intake is situate upon what, in this report, is called the lower district of the River Lea?—Yes.

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225. Mr. *Kekewich.*] Then what is the meaning of the Report of the Commissioners when they say: "The middle district, lying between the commencement of the New River at Hertford and the intake of the East London Water Works at Ponders End, comprises a population of 79,000 persons"?—The words are not exactly correct, but the meaning is quite correct. If the intake were there it would be no better than where it is.

226. Mr. *Headlam.*] No sewage is let into the river below Ponders End?—No.

227. Mr. *Cripps.*] The report says: "The lower district commences from the intake of the East London Water Works Company at Ponders End." In fact it should be: "The lower district commences from where the intercepting works are at Ponders End," that would be more correct, would it not?—It would.

228. They state: "From this point the river ceases to be a source of water supply, and becomes in a great degree like an open common sewer," and then there are various amplifications of that statement; but it is in its course where it is so described that your intake is situated, that is to say, in the lower district?—No; the lower district I imagine begins at the point where the intercepting drain discharges itself.

229. Let us take Ponders End as the point, whatever it means; supposing the lower district is described as commencing at Ponders End, then your intake of the water is of the water from the lower district?—Yes.

230. This is a report made by the chairman: "Your committee find from personal inspection that the water, before it reaches the filtering beds, is polluted in a most disgusting and abominable manner by drainage from land, overflow from cesspools, privies, factories, piggeries, &c., from the towns and places just before mentioned." That is a report from a committee signed by Mr. Leman the chairman of that committee, to the Board of Works for the Poplar district. Then the summary of the other report to which I referred is as follows: "That the water of the East London Waterworks Company is polluted to a very large degree by the drainage of the towns and villages upon the banks of the River Lea, from whence they draw their supply. That an abundant quantity of water, even of the character at present supplied, is not to be obtained in the summer without storing it for several months in open ponds; lastly, that pure water in sufficient quantity for the present, and the probable future wants of the district cannot be obtained in my judgment from the present source of supply at all." I call your attention to these reports; how far do you agree with them?—I do not agree with the latter conclusion at all.

231. With the first one I assume that you do agree?—I admit that within the area of the river Lea there are sources of pollution as there are upon all rivers.

232. And the object of your intercepting sewer (how far it was sufficient or not may be a question), was to remedy some of those impurities and defects in the river, was it not?—It was to remedy the most glaring of them, and it entirely intercepted a very large proportion of the towns, such as Edmonton, Enfield, Hornsey and Barnet.

233. As to what you consider the worst drainage, you had a scheme for intercepting that, had you not, which you have now dropped?—That is merely a technicality.

234. *Chairman.*] How do you mean a technicality,

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cality; is it not rather a reality?—Because we are anticipating something more comprehensive; we do not withdraw it, because we wish to escape from it; but because we see imminent a better arrangement of a more comprehensive character.

Cross-examined by Mr. *Pember*.

235. I think that you have said already that one great object of your Bill, is to take more water from the Lea than you have hitherto taken?—I do not know that I have said so; but that would be the effect of the gradual progress of the company.

236. Is not that the object of your Bill?—The object is to make the sources more secure, and to some extent purer.

237. Will you just amplify that a little?—To make the sources more secure, and to some extent purer.

238. Now let us take the word "security" first; what do you mean by making the sources more secure?—Having a good store of water in hand.

239. But that is not what I ask you; do you propose by the works to be authorised by this Bill to take more water from the Lea than you have hitherto taken?—Not to take more water than we had power to take.

240. That is not the question again?—The taking of more water is a necessary flow of circumstances. The company has a continual growth, and more and more water is taken every year.

241. What has hitherto been the daily flow of water down the Lea that you have taken away?—Nineteen million gallons and upwards daily in the last year.

242. Twenty million gallons a day?—Yes; roundly stated.

243. Do you contemplate, if this Bill passes immediately, taking more than those 20,000,000 gallons a day?—Altogether depending on the demand. We have no particular immediate necessity for increasing that quantity, but if the supply of our district calls for it we shall give it if we have it.

244. Do you contemplate power to take more than 20,000,000 gallons a day?—Yes.

245. At present of course you take the supply from below Chingford Mill?—Yes.

246. There is a weir just above Chingford Mill, is there not?—An escape weir out of Chingford Mill head.

247. There is a weir out of Chingford Mill which keeps the water up?—There is.

248. And there is no weir between Chingford Mill head and the navigable part of the River Lea, is there?—No; there was one, but it has been removed.

249. Then, hitherto, in taking your water from below that weir, you have never been enabled to draw down a head of water above the weir?—No.

250. And now you would do so?—Yes; perhaps so.

250*. Is it not an absolute fact that you would; there is nothing to prevent you, is there?—I do not know at this moment the fall between the navigation and Chingford Mill.

251. There is no weir there at all, is there?—There is no weir.

252. Do you happen to know what the minimum dry-weather flow of the river Lea is at that point; is it not 40,000,000 gallons a day of 24 hours?—I wish it was so much.

253. That is the figure given in the Report of the Rivers Commissioners; do you happen to know whether that is correct?—It is not correct.

254. What is the minimum dry weather flow of the River Lea, at the point where the cut that comes down to Chingford Mill runs out of it; at Ponders End lock, what is the minimum dry-weather flow of the water?—The extreme minimum of the driest seasons we have had, would be somewhere about 20,000,000 gallons.

255. Can you tell me what the average flow is?—I could not give you that.

256. *Chairman.*] How long did that extreme minimum last?—I should think more than two months.

257. That was in the year 1864, I presume?—It was.

258. Mr. *Pember.*] Have you made any calculation as to the additional amount of water, over and above what you take now, which you will be able to get in the course of the year, or per diem out of the River Lea from taking the water from above Chingford Mill?—Do you mean by impounding flood water.

259. First by impounding flood water?—My idea is, that I shall be able to hold in the storage reservoir 300,000,000 gallons of water, which I cannot hold now. With the addition of that store, I shall be able to extend the supply to a larger amount than I can now according to the degree to which I draw upon that store; but the exact limit to which I may be able to go, with the help of those works, is more than I could very definitely state.

260. Could you give us any idea of it?—I should think that I might go to 27,000,000 or 28,000,000, or perhaps 30,000,000 gallons a day.

261. Over what you do now?—No; altogether as well as the running river; so that I might carry out a total supply of something under 30,000,000 gallons, the supply now being something under 20,000,000 gallons.

262. Lord *Frederick Cavendish.*] With the works proposed in the present Bill?—With those works; but my other Bill is also to fill this reservoir from the Thames water, and, therefore, between the two I think I shall make myself safe.

363. Mr. *Kekewich.*] Your supply now is 22,000,000 gallons, is it not?—That is the extreme supply in very hot weather under special circumstances.

264. Mr. *Pember.*] Is that providing you only take flood water?—I can hardly say.

265. Then you do contemplate taking water otherwise than when the river is in a state of flood?—Yes.

266. And if you contemplate taking the water when the river is otherwise than in a state of flood, there will be no limit, will there, except the capacity of your reservoir to receive it, and of your pipes to carry it away, to the amount of water which you can take from the River Lea?—There is no limit defined in the Bill.

267. This Act of 1855 was an Act promoted jointly, was it not, or by agreement between yourselves and the New River Company and the River Lea trustees?—Yes.

268. And such provisions were made in that Act, I presume, as were thought requisite for the sake of maintaining the navigation of the River Lea?—Yes.

269. And by those works you contemplate

taking more water than you could have taken under that Act?—No; I do not see that.

270. Or is it that you will not say that?—No; I do not see it. I am entitled to take under that Act all that I can get hold of.

271. All that you can get hold of, subject to certain conditions?—No; free from any conditions.

272. You must give a particular daily supply, must you not, first of all to the River Lea trustees?—They are entitled to certain water for the use of the navigation, which water we may buy up, as it were, by providing them with steam power, so as to pump it back at each lock; so that we have the power to take the whole.

273. What section of the Act of 1855 gives you that power of taking further water, provided you can pump it back by steam power?—I am not quite sure whether that is in the Act, or in an agreement appended to the Act.

> The *Chairman* inquired whether it was proposed to alter the rights of the trustees under section 30.
>
> Mr. *Clerk* stated that there was no such intention, and said that it was proposed to insert in the Bill clauses to preserve all the rights of the River Lea trustees in the waters of the River Lea, and that nothing would be done under the Bill to diminish the rights of the River Lea trustees in those waters.
>
> Mr. *Pember* submitted that, however the Act of Parliament might be framed, there was the question whether, if any more water were taken, it would not interfere with or endanger the navigation of the river, and whether any abstraction of the water above would not make the water below more polluted.
>
> The *Chairman* stated that if certain rights were given by section 30 of the Act of 1855, all that the River Lea trustees could do was to see that those rights were reserved by this Bill, they being of course entitled to appear as owners of the mill which it was proposed to take under compulsory powers.

Cross-examined by Mr. *Johnson.*

274. Did you hear my learned friend, Mr. Hope Scott, open this case?—Yes.

275. You do not seem to concur with him that the object of this work, letter N., in the works to be authorised, was entirely (using his own language) "for flood water, and for no other purpose?"—So far as the new powers of the Act go, they apply to flood water.

276. How do you mean "the new power;" the power of the Bill enables you to take much more than the flood water?—By purchasing the water we acquire the power which is now in the freeholder's hands.

277. But, irrespective of the power of purchasing the mill, if you execute those works, that is to say, if you make this conduit below the present head level of the mill-dam, and can convey the water to a reservoir at a distance, it enables you, without purchasing the mill, to appropriate a great deal of water that at present supplies that mill, does it not?—There is the physical power of taking the water.

278. And that would be a great deal more than the mere flood water, which of course would be of no use to the mill?—Yes.

279. Then I say you do not agree, as to the object of the Bill, with my learned friend who opened the case for the promoters?—The object of the Bill is to take the flood water from the head of the mill, but the purchase of the mill will put us in the freeholder's shoes.

280. You take power to purchase the mill, but we cannot compel you to do it; you give us notice, and those are the only circumstances under which they can compel you to take the mill?—We shall be happy to be compelled to purchase it.

281. Then do I understand that your absolute purpose and object is to purchase this mill out and out?—Yes; we have been ready to purchase it before now; but the trustees have said that there was a disability in the matter, otherwise it would have been concluded long ago.

282. Of course, you are only expressing your view or opinion on this matter. You would have the power, without purchasing the mill, of executing the works which you are seeking Parliamentary authority to make, would you not?—I suppose that is so.

283. How much would that reduce the head level of the mill; would it be something like five or six feet, supposing you exercised to the maximum the power which you obtained by the construction of this conduit?—I cannot say; I might draw the water considerably; I do not think I could reduce it so much as that, with the works I am proposing. If I draw the water out of the head, I have not got in the tail, you know.

284. But you do not seek to take it from the tail?—But I am at present taking it from the tail, and if I take it from the head by another channel, I have not got it in the tail still to receive.

285. If you take it from the tail, it would not affect the mill at all; but if you take it from the head, it immediately affects the mill?—Yes; but gallon for gallon it is just the same above or below.

286. But surely you cannot mean that it is the same to me, the millowner, whether you take the water above the mill or below the mill?—Certainly not.

287. Then my question is, how many feet you will reduce the water from the mill head by the power which you seek to obtain under this Bill?—I have no intention of reducing it at all.

288. But never mind the intention; what does this Bill give you; the power of reducing it below the present head level of the mill dam; is it five or six feet?—It depends upon the magnitude of the channel by which I should draw it.

289. Does not that appear in your plan?—Yes.

290. Will you, in point of fact, destroy the means of working this mill by the abstraction of the water over which you take power?—I may seriously detriment the power of working the mill.

291. But will you not destroy the means of working the mill by water power?—Yes; I suppose you may so interpret it.

292. But you say you suppose so; have you any doubt about it?—I had not intended the channel leading out of the mill head to be of a size to do it; but I suppose I am limited in the size I may make that channel.

293. Would you be content that we should insert a clause that you should take only the flood water?

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water?—No; because, why am I not to purchase that right which the freeholder has?

294. But supposing you do not purchase the mill out and out, will you be content to say, in the words of Mr. Hope Scott, that you will only appropriate the flood water?—I suppose I may agree to purchase the mill if I take more than the flood water.

295. Assuming that we retain the mill, will you be content to appropriate, for the use of the water company, merely the flood water?—You are the leaseholder?

296. I am the leaseholder till 1882; that is 15 years more?—I propose to purchase the freehold, and acquire the freeholder's right to take the water.

297. Are you content to be limited altogether to the appropriation of the flood water, and the flood water only, in the words of my learned friend, Mr. Hope Scott?—Not at all.

298. *Chairman.*] Can you fill the additional reservoir of 300,000,000 gallons by merely drawing off the flood water from the mill head, and without using the ordinary flow through the mill race?—I do not think that I should get the full benefit of my reservoirs by limiting myself only to the flood water altogether.

299. You would not keep your reservoir as full as would be necessary for the purposes for which this Bill is promoted?—Yes.

300. Mr. *Headlam.*] In point of fact, you would take more than the flood water?—No doubt.

301. Mr. *Benyon.*] You could not fill the upper part of your reservoir, if you did not take it down the ordinary height of the mill head?—Just so.

302. Mr. *Johnson.*] If you took it from the mill tail, and substituted steam power for the natural motive power of gravitation, you could then take it from the mill tail, could you not, and force it into the reservoir by artificial means, instead of allowing it to flow by natural means?—Yes.

303. What would be the cost of a steam engine for that purpose, forcing it from the mill tail instead of the mill head?—I cannot say.

304. *Chairman.*] What is the mill?—A flour mill.

305. Mr. *Headlam.*] Would it not be cheaper to put a steam engine into the mill?—Far cheaper.

306. Mr. *Johnson.*] Would a steam engine for the mill be less costly than a steam engine to force the water to the reservoir from the mill tail?—I should think it would be a better adaptation of power.

307. Never mind whether it would be better; would it be more costly?—I do not know.

308. Do you understand my proposition; that, instead of the steam power being put into the mill by the millowners, the steam power should be applied to forcing the water from the reservoir by artificial means?—It would be a great deal better to compensate you for the damage.

309. Now let me ask you upon a matter about which you do know; do you know that my client, Mr. Hunt, has been for many years in possession of this mill?—I believe so.

310. And do you know that, after those disputes, which he had reason, at all events, to suppose were settled, he laid out a very large sum of money upon the mill?—I do not know at all. Money has been spent upon the mill, but whether by the leaseholder or by the freeholder I do not know.

311. Has a large sum of money been expended upon the mill since the Act of 1855?—I cannot speak positively; I should think that it is since the Act of 1855; I have seen works going on there; I have seen them building a new wheel.

312. You assume that you are to have the power of appropriating any quantity of this water you think proper, so that you leave enough for the navigation?—Yes.

313. Without the works which you seek Parliamentary authority to carry out under the present Bill, have you the means of appropriating any such water?—Not without those works.

314. And, therefore, without this Bill being converted into an Act, you could not appropriate that water?—I believe not.

315. There are no physical means?—I believe not.

316. And no legal means?—I believe not.

Cross-examined by Mr. *Henry James*.

317. Are you acquainted with this locality of Low Hall Farm yourself personally?—Yes.

318. Then you are aware of the manner in which this water runs through this open drain from the small stream, the Copper Mill stream, and down below Low Hall Farm?—Yes.

319. How long have you been acquainted with its running in that way?—I have been acquainted with the neighbourhood and the channels for the last 16 years.

320. The stream runs through, I believe, more than one farm; it runs through land in the occupation of different tenants, does it not?—Yes; the land of other parties besides Mr. Bosanquet borders upon it.

321. The water there has been used for agricultural purposes, has it not, such as cattle drinking, and so on?—I do not know; I never saw any cattle drinking it; it is very dirty.

322. The cattle do not mind that, perhaps. When you first knew it, was there a sluice used which communicated between the Copper Mill stream and this open drain?—There was a sluice, and there is still a sluice, by which the water may be allowed to pass out of Copper Mill head.

323. Recently there has been a 6-inch pipe placed, has there not?—There has been a 6-inch pipe placed, and there is a sluice on the pipe.

324. You call a cock a sluice, I presume?—Yes.

325. Who has the key to open that sluice?—The company.

326. Is there one key in possession of the company and one in the possession of the person who is called the marsh bailiff?—The company is in possession of the key.

327. Is there not another key?—I believe that there is, but the company have the original.

328. Who has the copy key, then?—I do not know.

329. Is it in anybody's possession?—I do not know; it is surreptitiously made.

330. And is it surreptitiously kept?—Yes.

331. Why has it not been asked for before?—Because if it were they would make another.

332. You know that the marsh bailiff is the person appointed by the Commissioners of Sewers?—I do not know that he is; I believe that he is not.

333. By whom is he appointed?—By the Commissioners of Sewers, but not for this duty of marsh bailiff.

334. Do you mean to represent that that public officer, if he has that key, and were asked for that key, would make another key surreptitiously?—I suppose so. The key was always kept by the owner of the mill.

335. To your knowledge has the marsh-bailiff been in the habit of opening that sluice, with that key, regularly?—Not the marsh-bailiff.

336. Any one?—A man.

337. Who is that?—I do not know the man's name, but it is some one connected with Low Hall Farm, I believe.

338. And that is the person to whom you have never applied to have the key back?—Never.

339. Have you ever objected to their having that key?—We have gone and shut it again.

340. To whom have you objected?—I do not know.

341. Then why did you say that you had objected?—Because objections have been made to the party opening the sluice.

342. Who was it?—I do not know the man.

343. Who made the objections?—Some of my men.

344. Have you ever heard them?—No.

345. Who is the man who objected?—The man who has the charge of the proper key.

346. Who is that?—The man living on the premises.

347. Why do you say that he has objected?—I have been told so; I have heard that he has.

348. The water, as far as you know, whether it has been opened by one person or another, has flowed down through this sluice, or open drain, has it not?—Yes.

349. You propose now, by this Bill, to take the whole of that supply away?—Yes.

350. Can you suggest to me any means by which water can be found, for the agricultural purposes of those farms, when this water is taken away?—The water which issues from this sluice is in general but a very small portion of the water going down the public drain. I do not propose to compensate for taking one water by making another.

351. I did not ask you that question; I think you heard my question; at least, probably it caught your ear in a different sense to what I intended it. If the water, which you say will be taken by this Act, is taken away, what water will be found on those farms for agricultural purposes?—No new water.

352. Old water?—They have the water of the other drain.

353. Does that go through Mr. Bosanquet's land?—Yes; because it flows into it.

354. Are you going to continue that other drain?—We are not going to interfere with it. We may alter the course of it a little.

355. Where is the other drain on Mr. Bosanquet's land, because the owner of it never heard of it until now?—The main drain.

356. Do you mean to represent that that is a supply of water going through that farm, either for agricultural purposes or for any purposes?—Yes; there is a considerable supply of water.

357. From where; from a reservoir?—The upper end of that stream is Heigham Hill. A considerable extent of country drains into the other drain, except this one.

358. In summer time is there a good and sufficient supply of water in that drain for agricultural purposes?—Yes; I think so; I do not recollect ever seeing it dry.

359. In summer time you say that there will be enough water for agricultural purposes, from that supply?—I do not know about agricultural purposes.

360. Can you tell me about what is the supply taken weekly for this purpose, let the sluice be opened as it may, or by whom?—I do not know the quantity at all.

361. Can you tell me, approximately, within 200,000 and 300,000 gallons?—No.

362. Should I be wrong in saying that it was from 500,000 to 600,000 gallons a week; you supplying 30,000,000 gallons a day?—Do you mean by the whole drain?

363. I mean through the sluice?—There is not that quantity.

364. Not in a week?—No.

365. How much would you put it at?—I have really not made an estimate of the quantity.

366. Of course you would remove this sluice by your new reservoir?—Yes.

367. Apart from this question, of your losing so much water, would there be any physical obstacle to your giving the water, by means of pipes tapping the Copper Hall stream, above or below your suggested reservoir?—Apart from the question of the propriety of our doing so, there would be no physical difficulty.

368. Therefore, the only objection would be the loss of so much water?—The only objection would be the loss of so much water.

369. Have you seen the flood-gates near Low Hall Farm?—Yes.

370. To what persons do you represent that those flood-gates belong?—I suppose that they are the property of the farm.

371. For what purpose are they used?—To dam up the water.

372. Which is surreptitiously obtained?—All the water which is helped, to a small extent, by means of this sluice.

Re-Examined by Mr. *Clerk.*

373. My learned friend, Mr. James, rather assumes, that the whole of the water running down this drain, past Low Hall Farm, is water running through those iron pipes from Copper Mill Lead, is that the case?—Not at all.

374. Is there not a drainage from the large area there?—Yes; this is Heigham Hill; the whole of this country drains into this conduit (*pointing out the same*). The issue from the mill head comes from this point, through a private drain, across here, and then falls into a main drain and goes down the country and is liable to be fouled with the farm refuse, and so on (*describing the same*).

375. How often in a week is this water taken?—The old water right limits it to once a week, I think, from Saturday night to Sunday night, for the benefit of Lord Maynard's tenants.

376. Until this quay was made by some gentlemen, I believe notice used to be given to your servants to open this sluice at the time?—The key formerly was kept at the mill, and some man came to the mill and asked for the key, and they went up on Saturday night and opened the sluice, and brought the key back on Sunday night, having shut the sluice.

377. Was it one of Lord Maynard's tenants, or whom;

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whom; who was the man?—I believe that he came from Low Hall.

378. Have you any idea what proportion the stream running out of this mill lead into the main drain bears to the whole drainage of the land going down that drain?—A very small proportion at times, but of course if there were an out-and-out drought the proportions would vary.

379. Now, then, to come from that to the opposition of the Metropolitan Board of Works; if you were to carry out what is suggested by my learned friend, Mr. Cripps, you would have to carry intercepting drains for a distance of 40 miles on either side of the Lea up to Luton, and about 25 miles up the Stort, on either side of the river to Bishops Stortford, and perhaps beyond, would you not?—I am not quite sure whether the learned counsel made that his proposition; but if interception were carried to that extent, of course it would be something of that kind.

380. In order to remove sewage matter effectually from the Lea, the whole area must be drained, must it not?—The whole area would require to be drained.

381. I believe that one of the things which deterred you from proceeding with the small scheme of intercepting which you proposed, was a report of Mr. Bazalgette's to certain parishes, suggesting a large drainage scheme for the whole watershed?—That was one of the reasons. Mr. Bazalgette's report and plan will go far beyond what I recommended.

382. That was the plan, I believe (*handing a Plan to the Witness*), showing the amount of drainage and interception of sewage which would be necessary for perfectly purifying those sewers?—Yes (*handing the Plan to the Committee*).

383. Mr. *Kekewich.*] Where is the outlet of that main drain?—Mr. Bazalgette proposes to carry it to the same outlet as the Metropolitan drainage at Barking Creek, and to intercept a great deal of the drainage of Essex; all the valley of the Lea and a shoulder of the county of Essex which now drains into the Lea and the Thames.

384. Mr. *Clerk.*] Could you, on behalf of the East London Waterworks Company, have had the means of making any such outfall as that which is proposed by Mr. Bazalgette?—Not at all; it is a much more comprehensive scheme than we could contemplate, or find any interest in.

385. And it would be a scheme dependent upon the greater drainage scheme, and carried out in connection with it?—It would have to be carried out by the establishment of some new commissioners, I imagine, or by some much more comprehensive system and power than we have any chance of obtaining.

386. My learned friend has read to you a great many passages from the Report of the Rivers Pollution Commissioners, with regard to the sewage of different towns. I believe that when that Commission recommended a Board of Conservancy for the purpose of purifying the rivers, you considered that the very small works undertaken by you would rather conflict with such large powers conferred upon the Conservancy Board?—Yes; I consider that now that would be the effect of creating this power.

387. They might be inconsistent with such a system as is proposed by Mr Bazalgette, or with any which the Board of Conservators might propose?—Yes.

388. Such an idea as that of making the water company divert all the sewage from the river from which it draws its supply was not thought of in the case of the Thames companies, was it?—Not at all; the idea is preposterous; they are not the sinners who produced the mischief.

389. If my learned friend, Mr. Cripps's, idea on the part of the Metropolitan Board of Works is carried out, the Thames companies ought to have made an intercepting sewer beyond Reading up to Thame, ought they not?—Yes; that would be parallel reasoning.

390. A complaint is made that you have dropped your intercepting sewer, which the Metropolitan Board of Works complained of as an imperfect scheme. I suppose that you are most desirous to see the Report of the Rivers Commissioners carried out, and to see a Board of Conservancy established to divert all the sewage from the Lea?—Yes; I approve, on the whole, of the recommendations which the Rivers Commission have put forward; I think that they have put the matter in a very correct light, and I do not see, on the whole, any better plan of tackling the difficulty than that which they have proposed.

391. There is one point on which I think there was a little misapprehension on the part of my learned friend. In the report they speak of your supply being taken at Ponder's End. They say, "The lower district commences from the intake of the East London Water Works Company at Ponder's End." Your water is as pure as it is at Ponder's End, but you do not take it at Ponder's End, but at Lea Bridge?—Strictly speaking we do not take it there.

392. Virtually speaking you may be said to take it from the Ponder's End point?—Yes.

393. Then they go on to say: "From this point the river ceases to be a source of water supply, and becomes, in a great degree, like an open common sewer. At the foot of Tottenham Lock is the outfall of Catchwater Dyke." That is all below the parts from which you take water, is it not?—That is below the parts from which we take the water. There is no additional fouling in the river till you come down to the outfall of the Catchwater Dyke.

394. Now I think I may leave that. With regard to the River Lee trustees I think that I need not trouble you, because you are prepared to secure to the River Lee trustees all the rights to the water which they may have at the present time?—Precisely; we do not wish to interfere with them at all.

395. With regard to that question which was asked by my learned friend, Mr. Pember, which you could not answer at the time, as to pumping back-water to the River Lea trustees, I see that that is the 31st clause of the Act of 1855 (*reading the same*).

396. Now, then, with regard to the interests in the Chingford Mill of the Messrs. Hunt; those we are informed exist under lease granted in the year 1854?—Yes.

397. Now, then, are you prepared, on the part of the East London Water Company, to recommend that they should put themselves in the position of the Lea trustees as the lessors, so as to give all compensation to the tenants to which they may be entitled under that lease?—Yes.

398. Whatever claims they may have in respect of loss of water, you will be prepared to pay them for that?—Whatever the present lessee has against his lessor we are ready to accept.

399. And to give them full compensation for

any rights which they have now either at law or as qualified by their lease?—Yes.

400. If you only took the flood water, you would not interfere with the working of the mill at all, would you?—We should rather improve it, decidedly; but every drop of water taken from the head would tend to the benefit of the tail.

401. If you only took the flood water it would be of no importance to you?—None at all.

402. But as you consider it may be important to you to take more than the flood water, you propose to buy the mill?—We propose to buy the mill.

403. That would be a much easier way to meet the difficulty than by putting up steam power or anything of that kind, would it not?—I think that it will be better to buy those mills and quash them than to perpetuate them by the erection of compensation power.

404. *Chairman.*] Have you any estimate of the several works which you propose to construct separately?—Yes; to some extent separately.

> The question having arisen as to Captain Tyler's being called,

> The *Chairman* stated, that when the cases for and againt the Bill were closed, the parties might then be heard upon Captain Tyler's report if anything arose upon it.

405. *Chairman* (to the *Witness*).] Can you give an estimate of the works, distinguishing the items?—The estimates of course include a considerable amount of land; but, including the land in the sections of the works for works under letter A., and other letters subsequent to A., for the filter beds at Lea Bridge the estimate is 32,000 *l.* The estimate for the works D. is 47,000 *l.*; that is the reservoirs south of those already made. The works E., which are the reservoirs north of those already made, will cost 58,000 *l.* The works N. are to cost 11,875 *l.* Then sundry other works and property, which need not be particularised, make up a remainder of 15,525 *l.*

406. What is the difference of the level of the water at Tottenham between the New River Company's reservoir and your reservoir?—Chingford Mill is a whole river mill. Below Chingford Mill the river divides into two portions which, by a special contrivance, have been made equal. Half the river goes to what was formerly the copper mill, and half the river goes to the Tottenham Mill. On the level of the copper mill are our reservoirs. The Tottenham Mill belongs to the New River Company.

407. But what is the relative level of the water at the New River pumping station and at your reservoir at the copper mill?—The New River pumping engine is built to draw the water from the level of the tail of the copper mill. Our reservoirs are on the level of the head of the copper mills, so that there is six feet difference. We are above the level from where their suction draws the water.

408. Is that above the level of the New River itself at that point?—The New River is 70-odd feet higher than that. The New River starts off from near Hertford, and preserves a high level in order to take the water into London as high as it can.

409. Then, when you speak of the Tottenham pumping station, that is assuming that the New River Company drew the water from the River Lea at Tottenham?—I thought that that was what you were alluding to, because that is the only engine they have.

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410. Is that used at present?—It is not within my knowledge to what extent it is used.

411. How far is your reservoir from the New River at the Tottenham reservoir?—I should think about a mile and a-half.

412. And there it is considerably above the level of your reservoir?—From 70 to 80 feet above it.

413. What is the objection, or is there any objection, to your drawing water from the New River?—There is no objection, except that the water is not there, and can hardly be got there.

414. In what way is it not there?—The water is not existing in the upper levels of the river in sufficient quantities for the New River to be able to divert it.

415. Do you mean that the New River Company cannot draw more than they use?—They could draw more, but not enough to supply the two companies, because at times we have had enough to do to find the water where we are receiving two tributaries and a large portion of the main river beyond what flows past their source at Hertford.

416. But, so far as drawing flood water is concerned, or any water, except in the very dry season, I presume there is an abundance of water to supply the New River?—The New River has a very fair supply at Hertford.

417. They have the right to draw 35,000,000 gallons daily, have they not?—22,500,000 gallons; 2,500 feet a minute is their fullest right.

418. What does that amount to in gallons daily?—22,500,000 gallons.

419. Mr. *Kekewich.*] They do not draw that, then?—I believe that they have not yet drawn it.

420. They draw 18,000,000 gallons?—They have told us so, and we do not spy upon what they are doing. The machine is so made that they cannot draw more than 2,500 feet. Whether they draw much below or only a little below, is a matter on which we do not exercise any particular care or interference.

421. The water at Chingford Mill is the whole river, is it not?—The water at Chingford Mill is the whole river.

422. If you took the water in dry weather from above Chingford Mill, there would not be enough left to supply the mill with water?—It is a breast-wheel. All the wheels on the Lea are breast-wheels; I believe that there are no over-shot wheels on the Lea; they are all under-shot wheels. If we took all we could, we should seriously interfere with the power of the mill.

423. But would you have enough if you took it only at flood water?—No; we should not be able to fill up our reservoirs. We should not pursue our necessities or advantages to the extent we ought to.

424. Mr. *Henry Baillie.*] Provided that the water was purified up to the sources of the Lea and its tributaries, do you consider that you would be able to draw a sufficient quantity for any increased supply which might be demanded?—That is a most serious view to entertain on Mr. Bazalgette's plan. I fear that this plan will divert a large quantity of water with such very extensive system of drainage. As you press the question of quality, so you endanger the question of quantity.

425. *Chairman.*] If the whole of the flood water

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water were gathered into a reservoir, would that fill the reservoir which you propose, or even a much larger reservoir?—I think that the whole of the flood waters, if we could contrive to catch them all, would certainly fill a larger reservoir than I am proposing now.

426. Do you know the quantity flowing down the Lea in a flood?—It runs up to 30,000 and 40,000 feet a minute in flood times.

427. What would that be in gallons per day? —It runs into very large quantities, but years differ. The average of floods would certainly be a figure, but it would be one which an engineer could not make much use of.

428. Mr. *Kekewich.*] Is the Lea River one which rises very quickly on account of its many tributary streams?—The upper tributaries do not flood very rapidly. It is not until the junction of the six tributaries that it floods very rapidly; but from there downwards on the marshes it floods very rapidly.

429. It is a sluggish river, is it not?—I think not. It has a good fall.

430. *Chairman.*] Do I understand you, that if the intercepting drains were made on Mr. Bazalgette's scheme, the quantity of water intercepted from the river would be so great that you would not be able to obtain water?—I should hardly say that. It would depend upon the perfectness with which they were made. Drains made through a valley very often carry away more water than is desired, on account of the porosity of the bottom of the sewers; but if they are very carefully made, so as not to carry away more than the pipe's sewage, then the interception would not be very great.

431. You think the water would be sufficient for your purposes after the drain was made?—It would be admirable water. It would take off a quantity of water certainly, but how much I cannot possibly say, because it would depend upon the expense which they put into the drain, and the excellence of the work.

432. Colonel *Hogg.*] The main drainage works have virtually interfered with the supply of water, have they not, and have made many pumps and wells dry in London?—I have heard that they have.

433. *Chairman.*] What plan do you ultimately propose to improve the supply of water from the Lea, below the New River cut?—We must hold our hands in abeyance until we see the upshot of the Rivers Commission, and the joint parishes below, who called in Mr. Bazalgette. We hold ourselves ready to contribute in some way, but in what way it is impossible at present to say.

[Adjourned to Thursday next, at 12 o'clock.

Thursday, 23rd May 1867.

MEMBERS PRESENT:

Mr. Ayrton.
Mr. Sclater-Booth.
Mr. Benyon.
Mr. Henry Baillie.
Lord Frederick Cavendish.
Lord John Hay.
Mr. Headlam.
Colonel Hogg.
Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

EAST LONDON WATERWORKS (VARIOUS POWERS) BILL.

Mr. Charles Greaves, recalled; and further Examined.

Mr. C. Greaves.

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434. Mr. *Clerk.*] There is a matter, I think, which you wish to correct with regard to the estimate at Question 405; the estimate for the work D. you said was 47,000 *l.*?—Yes; it ought to have been 37,000 *l.*

435. *Chairman.*] Can you form any idea of the per-centage or proportionate quantity of water which would be cut off at the point where you draw, or propose to draw, the water from the River Lea if the system of intercepting sewers was carried out?—On Mr. Bazalgette's plan?

436. Yes?—I should not think that he would carry away less than 3,000,000 gallons a day.

[The Witness withdrew.

Mr. *Pember* stated that, after the intimation given by the Committee on Tuesday with regard to the opposition of the River Lea Trustees, he would reserve further opposition for the clauses, and he asked the Committee to allow the witnesses to be recalled upon the clauses, if necessary.

The *Chairman* stated that if questions arose requiring such evidence the witnesses might be recalled.

Mr. *Clerk* stated that the Promoters of the Bill did not admit Mr. Pember's right to call any such evidence, because the Act of 1855 had entirely disposed of all questions of the right to the water of the River Lea Trustees, *qua* trustees, and that it was proposed to reserve all the rights that they had, but to confer no new ones.

The *Chairman* stated that if the River Lea Trustees desired it they would be heard upon the clauses.

Mr. *Clerk* stated that he proposed now to call Mr. Bateman, simply upon the works in the Bill, and not upon the general question.

Mr. JOHN FREDERICK BATEMAN sworn; Examined by Mr. *Clerk*.

Mr. *J. F. Bateman.*

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437. I BELIEVE that you were requested to consider certain plans on the part of the East London Water Company for getting a better supply of water during last autumn?—I was.

438. And I believe that you then put yourself into communication with Mr. Greaves, the engineer of the Company, and inspected closely all the works in the valley of the Lea?—I did.

439. With regard to works which you understood were a pressing necessity for their supply?—Yes; Mr. Greaves explained to me the whole of the circumstances of the existing supply, and I went into every question of it with him, and there was no doubt at all of the pressing necessity for obtaining an additional supply.

440. You inspected narrowly, I believe, the whole system of pumping and filtering, and all the distributing power of the Company?—I did.

441. The matter which was most pressing was the question of quantity, was it not?—It was.

442. Did you ascertain from Mr. Greaves the condition in which the river had been in the years 1863, 1864, 1865, and 1866?—I did; Mr. Greaves showed me the registries which had been kept of the quantity of water which was delivered, the quantity of water in the river, and the quantity of water in store from time to time, and from those I was able to deduce a history of the working of the supply of water of the East London Company for some years past.

443. I believe that you found that in the years 1864 and 1865 the whole river had been pumped for the purposes of the supply of the East London district?—Yes; I found that the quantity which was being supplied might be stated in round numbers at about 21,000,000 gallons a day now, and that the annual increase for several years past had been at the rate of about 400,000 gallons a day, so that, taking that increase for the future, in 10 years from the present time something like 26,000,000 gallons per day would be required for the population within the limits of the Company's supply.

444. Supposing it to go on increasing in the same ratio which it has done of late years?—Yes.

445. I believe that you found that the whole quantity yielded by the river independently of the storage works which had been made between 1863 and 1864, amounted to about 17,500,000 gallons?—In the year 1863 the quantity supplied was about 17,500,000 gallons; there was no storage, and the river was just able to meet the demands, but the whole river was pumped for eight days in July and 13 days in August.

446. *Chairman.*] That was in 1863?—That was in 1863, when the quantity supplied was 17,500,000 gallons a day. They were just able to meet the demands made upon them without limitation, but to do that they had to pump every drop of water for eight days in July and 13 days in August.

447. Mr. *Clerk.*] At that time they had no storage, had they?—At that time they had no storage.

448. In the year 1864 the river was less in volume than in the year 1863, was it not?—In the year 1864 the average consumption remained about the same as it was in 1863, and they had 45 acres of storage which had been constructed in the meantime. Notwithstanding that they pumped the whole river and the whole storage, the supply had to be curtailed from 125,000,000 gallons per week, which they were then supplying, or which would have been their full supply, to 105,000,000 gallons.

449. That was during a part of July and August, was it not?—I believe it was, but I have not here the statistics about it.

450. *Chairman.*] For how many weeks was that?—I have not that down here.

451. Mr. *Clerk.*] By the year 1865, all the storage which had been planned by Mr. Greaves was available, I think?—Yes.

452. One hundred and ten acres at Walthamstow?—No, not the whole. In 1865 the whole storage was not available, but in 1866 it was.

453. In 1865 did you find that the river was again entirely pumped, but that the storage was sufficient then to enable the Company to give all the supply which was required?—Yes; in 1865 the demand upon them, and the consumption by the inhabitants, had reached 18,000,000 gallons a day on an average, and the whole river was again pumped. There was no surplus for 23 days, but the storage enabled them to deliver the quantity demanded without curtailing the supply.

454. *Chairman.*] The whole storage of 100 acres?—The whole storage was not exhausted; at all events it was sufficient to enable them to deliver 18,000,000 gallons a day without lessening the supply.

455. I understood from Mr. Greaves that only the 45 acres of storage were available till 1865, and that the whole storage was not available till 1866?—That was so, I believe.

456. Mr. *Clerk.*] In the year 1866 they were not pinched for water, were they?—They were not; there was an abundance of rain.

457. And they had the whole storage of those 126,000,000 gallons?—Yes. I can now answer the question as to the time. In 1864 they were obliged to curtail the supply for three weeks, the river and storage together only yielding 15,000,000 gallons per day for that time.

458. And the demand having been, prior to that, 17,500,000 gallons?—17,500,000 gallons: 1864 and 1865 were the two driest summers; 1864 seems to have been that which most severely punished the East London Company.

459. Is it therefore a matter of immediate necessity to get some additional supply in the shortest possible time?—It is an absolute necessity. If there were such another dry season as 1864 or 1865, or one approaching to either of those seasons, East London would be without water, or at least it must have a diminished supply of water.

460. One hundred and seventy million gallons of storage would only supplement, of course, the quantity in the river for a limited time?—You may calculate that as being about worth 3,000,000 gallons a day; and if you take the river as yielding, as it did in 1864, only 15,000,000 gallons, that gives you 18,000,000 gallons to meet a demand of 21,000,000 gallons.

461. For about two months?—About 60 days.

462. And that in a very dry season would only just give the present demand?—In a very dry season it would not give it. In 1864, for some period of the year, it was no more than 15,000,000 gallons

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gallons a day; and 3,000,000 gallons of storage added to that would only give 18,000,000 gallons.

463. I see that you take the quantities supplied for the demand as 21,000,000 gallons. I think that 19,500,000 gallons is the average of the whole year?—Yes.

464. That being the state of things, did you consider in what mode the company could best meet that pressing demand?—I did. In the River Lea itself there was no means of getting an additional supply of water, except by increased storage, or by sinking into the chalk which lies beneath the London clay, from which some supply of water might be obtained.

465. You are aware, I dare say, that Mr. Greaves has already sunk a well into the chalk in the neighbourhood of his works, and only obtained something under half a million gallons a day?—Yes, at Walthamstow.

466. And from your knowledge of the chalk formation there, may that be taken as about the quantity which might be got for each well sunk?—The quantity yielded by any well is a very uncertain thing. Perhaps, generally, wells may be taken to yield about 1,000,000 gallons of water a day. The wells sunk for the supply of water very generally throughout the country, where they are sunk into waterbearing strata, vary from about half a million to a million and a half gallons each day.

467. Mr. *Henry Baillie.*] How deep do the wells go down?—That depends upon their position. If you take the new red sandstone of Lancashire and Cheshire the wells are generally sunk to about 50 or 60 feet below high-water level; and those levels, on the average, at Birkenhead and Liverpool, and that neighbourhood, generally, yield something like a million gallons of water a day. That is in the new red sandstone formation. Wells in the chalk formation, in the same way, have yielded their water, no doubt, according to a line running from Watford towards the sea, and the wells towards the sea used to get water at a higher level than those farthest from the sea; but all the wells have become lower and lower, and the level of saturation is much lower than it used to be.

468. Mr. *Clerk.*] Did you learn, at that time, that Mr. Greaves had it in contemplation to increase the capacity of his storage reservoir at Walthamstow?—Yes.

469. Does it appear to you that that is the wisest course to adopt to meet the pressing necessity which exists?—It is the only certain course by which you can increase your supply in that valley, and it is the most expeditious course.

470. That could be commenced at once, and would soon be completed?—Yes; those reservoirs are not of difficult construction; they are upon good ground; the embankments are not high; and it is a character of work which may be constructed with facility and rapidity.

471. Did you examine the place where Mr. Greaves proposed to construct those reservoirs?—I did.

472. Did it appear to you to be well selected?—Yes; it is adjoining the existing reservoir. The works are very perfect.

473. Are the reservoirs out of the reach of floods?—The reservoirs are out of the reach of floods by the height to which the embankments would be carried.

474. And I believe you recommended the Company, among other things, to apply at once to Parliament for power to make such additional reservoirs?—I did.

475. If Parliament gives sanction to those additional reservoirs the Company will then have a storage of 500,000,000 gallons, will they not?—Yes; a gross storage of about 500,000,000 gallons.

476. And the greater part of that will be able to pass to the existing filtering beds without any pumping, will it not?—Within 50,000,000 gallons, at least; I think I am correct in stating that.

477. The original reservoir of 110 acres is of the capacity of 220,000,000 gallons, of which 170,000,000 gallons runs off, and 50,000,000 gallons require to be pumped?—That is so.

478. That would give an additional supply to the quantity in the river at any time of 100 days, would it not?—That would depend upon the season, but I think it might be, perhaps, safe to calculate upon adding about 5,000,000 gallons a-day to the natural supply of the river.

479. But still that would be hardly sufficient in itself, I believe; and there was a proposition, was there not, of increasing the filtering area at Lea Bridge?—Yes. That would not increase the quantity of water, that would merely increase the facility of filtering it.

480. And you could better regulate the supply, could you not, if you had a larger filtering area?—No; it would merely enable the company to give the water in a very pure condition by having a larger filtering area; but their filtering arrangements are at present very extensive and very good; and it would require merely an extension of the filtering area co-extensive with the additional supply proposed to be given.

481. I believe your attention was also drawn at that time to the proposal of Mr. Greaves, further to extend the intercepting drains which had been constructed in 1853?—It was.

482. Doubtless you are aware that since that Mr. Bazalgette has reported against them as being insufficient in themselves, and that the Royal Commission has reported in favour of a large general system of drainage of the Lea valley, and that, therefore, those have been struck out of the Bill?—So I understand. I know that Mr. Bazalgette has reported, and I know that that is the recommendation of the River Pollution Commission: and I hear that they are struck out of the Bill.

483. I believe you also recommended the Company to apply to Parliament for powers to do that which is proposed in another Bill, for getting a supply from the Thames?—I did.

484. We will not discuss that now. I believe your attention has been drawn to a clause which has been proposed to be inserted in the Bill, with regard to dealing with the works at Old Ford?—With reference to the reservoirs there?

485. With reference to the reservoirs there?—Yes.

486. The principal part of the pumping power of the company, at present, is at Old Ford, is it not?—It is.

487. We learned from Mr. Greaves that they were considerably increasing the pumping power at Lea Bridge?—Yes, that is part of the present scheme.

488. And you are aware, doubtless, from what is proposed, that all objections to the use of the covered reservoir at Old Ford will be got rid of?—By the plan proposed by Mr. Greaves, they will

be got rid of. I think Mr. Greaves is proposing more than is necessary there; but it will be satisfactory, I dare say, to other people.

489. There is some apprehension existing in the public mind with regard to the Old Ford reservoirs, and you think he is doing more than is necessary to remove it?—Yes. I do not mean to say that it is not necessary effectually to prevent any leakage or percolation from the external earth into that reservoir; but I think that, in proposing to fill it up as he is proposing to do, he is doing more than is necessary. Any evil might be effectually remedied by even smaller means than he proposes to take.

490. But shutting off that part of the reservoir which is in gravel, and raising the floor of the clay reservoir by four feet, and puddling it all round, will prevent the slightest possibility of filtration, will it not?—It will if the work be properly performed.

491. It would be necessary, would it not, to have a small reservoir of that kind, for the purpose of feeding the pumps which are in operation at Old Ford?—It is desirable; it is necessary, in fact. The whole quantity of water held by those two reservoirs is only 3,000,000 gallons, I think, now, and therefore there is only one-sixth or one-seventh of the quantity of supply in a day, two or three hours' supply.

492. According to their present capacity?—I think that is right.

493. Then this will be really only a well in connection with the main coming from the filtering beds, for the purpose of feeding those pumps?—It will be a mere regulating basin, equivalent to what is commonly called a "sump-well" or "sump-hole."

494. Now you are well acquainted with the nature of the Lea water: is that water, in your opinion, well filtered, as you have found it, at the East London Waterworks, and of as good a quality for domestic use as the Thames water?—Yes, it is a similar water, and there is very little difference in the quality.

495. And supposing the recommendations of the Rivers Pollution Commissioners to be carried out, so that there shall be legislation for the Lea similar to that for the Thames of last year, will the water of the Lea be superior to that of the Thames?—It will be still, I think, pretty nearly equal to that of the Thames, because the Thames will have to go through the same system of purification as is proposed for the Lea.

496. It will be as good then?—I think there will be very little difference.

> Mr. *Cripps* stated that though upon the general question he should desire to examine Mr. Bateman, he did not propose to put any questions to him upon this particular matter.

Cross-examined by Mr. *Johnson.*

497. Do you know the Chingford Mill?—I do.

498. Will you be good enough to tell me (I did not succeed in ascertaining it from Mr. Greaves) the works that are proposed there; do you understand that anything more than the flood water is to be taken there?—I understand that Mr. Greaves wants to have the entire command of the water there, and of the mill too.

499. So do I. So that he will have the power of taking such an amount of water as will incapacitate the means of working that mill?—He wants to be put in the position of having the entire command of that water, which may enable him to do what you are supposing.

500. But would not the power which he would obtain under this Act of Parliament totally incapacitate the working of that mill, if it were carried to its full extent?—Yes, if he had full power to deal with that mill, and with the water.

> The *Chairman* intimated that the Committee quite understood that the Water Works Company would have power to take the water without reference to the requirements of the mill.

501. Mr. *Johnson* (to the *Witness*).] Do you know the depth of water which is proposed to be drawn down from the natural level?—I think the fall at the mill is about seven feet, and then he would take it from the mill head, and that would give him seven feet advantage over taking it from the tail.

502. Of course the water at the tail undergoes no deterioration in quality?—If it is merely used for water power it does not.

503. And that would be so with a flour-mill?—Yes.

504. Supposing that you took it from the mill-tail the water would be the same; it would only be the additional expense of obtaining it there by means of a steam engine; what would be the cost of that?—I cannot tell you the cost by means of a steam-engine, because it is the flood water which Mr. Greaves wants to obtain, and that would be immensely large in quantity.

505. The flood waters are of no use to the mill, are they?—The flood waters are of no use to the mill.

506. Then you might regulate the flood water by a tumbling-bay, or anything which should be unnecessary for the mill could be run into the reservoirs at times of flood?—You mean if Mr. Greaves' plan was carried out as is proposed.

507. Yes?—That might be so. The flood-water which was not required for driving the mill might be conveyed by the channel which he is proposing to construct into the reservoir which he is proposing to construct.

508. Then any water below the level of the flood-water might be taken into the reservoirs by artificial means?—Yes.

509. Can you give me any idea of what would be the cost of adopting that process?—There would be 2,500 cubic feet a minute, and in round numbers 20,000,000 gallons a day. It would require about 40 horse-power.

510. And the cost of that would be about how much?—From 800*l.* to 1,000*l.* a year, pumping constantly, night and day.

511. Can you give me in the same mode an estimate of what would be the cost of putting up an engine in the mill to correspond or be equivalent in power with the water over which the company wish to take powers of abstraction?——

512. The *Chairman.*] What is the horse-power of the mill?—It is 2,500 feet per minute, supposing that that was always in the river, which is the whole quantity supposed to be in the river—though it is not always that. The horse-power is about 21 horse-power.

513. Mr. *Johnson.*] Then what would be the cost of supplying that power to the mill as an alternative to the company raising the water at the mill-tail by the same process, but by a different engine?—If it were working night and day——

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514. The *Chairman.*] Does the mill work night and day?—I do not know; but 2,500 feet per minute would be flowing night and day. Therefore, if it does work night and day, it would be so; 21 horse-power would cost about 500 *l.* a year.

515. Mr. *Johnson.*] I am only wishing to protect the interest of my clients; is this practicable, or could you suggest any mode by which it could be accomplished, that the water-power should be made good by a similar degree of steam-power; that is to say, supposing that you only drew down one foot out of the seven, you should supplement that by an equivalent in steam-power?—I cannot answer that question, because I have not specially considered the circumstances. It is a matter for compensation, or a matter for arrangement. I have no doubt that either compensation might be given, or an arrangement might be made for the benefit of both parties.

516. Then it is practicable, is it, so to adjust matters, as to provide steam-power just proportionate to the water-power which you withdraw?—That is quite practicable.

517. Supposing that you were the engineer for these works, do you contemplate that it will entail the absolute necessity of purchasing the mill altogether?—I have not considered the question. It is a mere question of expense; and, therefore, I cannot, without having specially considered it, tell you what I should propose to do.

518. Well now you say that you know the mill, have you known it for some years past?—I have not.

519. Then you cannot tell me (of course I must prove it, if necessary, hereafter) that of late years a very considerable sum of money has been expended upon that mill?—That I cannot tell you.

520. It is a very handsome mill, is it not; a very permanent structure?—It is a very good mill.

Re-examined by Mr. *Clerk.*

521. This, of course, is a question of compensation?—Wholly so.

522. Any arbitrator would have to take into consideration what rights the tenant has in the water, or how much he has already been paid for it?—Yes.

523. Mr. *Headlam.*] We have had evidence of the great impurity of the water higher up, and as I understand, when it comes for the supply after passing through the filtering beds, it is in a fair average state; is that the case?—I believe it to be so. Of course mechanical filtration through sand does not deprive the water of any impurity which it may hold in solution; but all mechanical impurities are taken out by filtration through sand.

524. Then you would attribute the different state in which it comes from the filtering beds from what we have heard to be its state higher up, solely to the filtration?—There is no doubt that water possesses in itself a self-purifying property; and water which may be very bad higher up, becomes very tolerable lower down.

525. In what kind of state is it before it passes through those filtering beds?—That will depend very much indeed upon the weather. In extremely fine dry weather the water will be bright and, apparently to the eye, it will be pure, or tolerably so, even as it comes out of the river; but in wet weather it will be more or less turbid, according to the quantity of rain which has fallen.

526. But, as a fact, what is the ordinary state of it immediately above the filtering beds?—Generally like all chalk water, it is a bright transparent water; a white water. When it is unaffected by rain, which carries anything from the clayey surface of the lower portion of the district, or from any of the upper portions of the valley, the water will be bright and clear, and you can see through it for some distance, 10 or 12 inches without any difficulty, and sometimes more.

527. Is there any appearance of great pollution in the state of the river immediately previously to the time that it passes into the filtering beds?—Not in fine weather; but of course all rivers which derive a large portion of their supplies from surface water and rains will be coloured whenever it rains, and will more or less be coloured according to the use made of it in all weather; but generally speaking, this will be a bright river, comparatively.

528. So far as regards the impurities which are cast into the river are concerned, they will be more the lower the river is, will they not?—The smaller the quantity of water, of course the less dilution there will be, and the larger proportion the impurities will bear.

529. So that in fine weather, although it may appear free from soil and impurities of that description, there will be a greater quantity of impurities cast into the river?—Yes; but they may not be present in flowing water; they may be deposited more or less within a short distance of where they are thrown in, and not sent to any distance till a flood comes, and then they will be carried down.

530. At the time when the whole river was used and there was no storage, was the water in a very bad state?—I did not see it, but of course they pumped everything which was in the river at that time; and it would depend upon the chemical or other changes which any of the impurities might undergo between the point of deposit and the place where the water is extracted. That is a chemical question which I cannot answer beyond a mere observation.

531. Would the water be better after those storage reservoirs were made?—Yes; all water which is collected in a comparatively impure or turbid state improves by settlement, which it will be able to get by those large storage reservoirs.

532. And the ordinary practice of the company will be to take their water from the reservoirs after it has passed through their reservoirs and been confined in the reservoirs for a certain time?—Yes; they will, of course, be dependent, to a considerable extent, upon the storage, because, if the river is only yielding, in dry weather, 17,000,000 or 18,000,000 gallons of water, and they want 22,000,000 or 23,000,000, something like one-fourth of the whole supply must come from the storage reservoirs.

533. But will they, under those circumstances, take their 17,000,000 or 18,000,000 direct from the river, and then take 4,000,000 from the storage, or will they take the whole from the storage, letting the 17,000,000 or 18,000,000 replace the quantity which they take out?—I cannot answer that question, inasmuch as I have not the working of the undertaking; but it will be quite easy for

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for them to take the whole of the water first into store. Supposing they were to purchase this Chingford Mill, so that they had no occasion to let any portion of that water be used for driving the mill, they could take the whole of the river into their storage reservoir and let it deposit there, and then take it from there to the point where it is distributed.

534. That would be, I suppose, a better course than to take it direct from the river?—No doubt.

535. Mr. *Benyon.*] You are aware, are you not, that there is an arrangement between the New River Company and the East London Company, for taking a supply from the River Lea together?—You mean the agreement by which the river is divided between them?

536. Just so. I mean that the quantity of water which comes down is divided between them, subject, of course, to navigation requirements?—I know that.

537. Therefore, when you are saying that the river is pumped dry, you are speaking as regards the East London Company?—I am only speaking of the East London Company.

538. And, therefore, you mean that the river is pumped dry as regards the quantity of water to which the East London Company is entitled?—I mean that every drop of water is pumped out of the river by the East London Company at the point where the East London Company take it.

539. As far as regards the East London share?—As far as regards the river absolutely. The river is divided at Hertford in this way. At Hertford, which is 30 or 40 miles up, the New River take its supply, and the river is supposed to yield beyond what is required for navigation, an equal quantity in its course from that point down to the place at which the East London Company take their water; and at that point, if they require the whole of the river, they take the whole of the river.

540. The New River takes its supply up above Hertford, does it not?—Just below Hertford and above Ware.

541. And above the place where the discharge of the sewage of Hertford is made into the river?—Yes.

542. And the supply of the New River is above the discharge place of the sewage of Hertford, is it not?—It is.

543. When you were talking of the storage, the storage, as I understood you, would only give 3,000,000 gallons a day; but then, afterwards you state that those subsiding reservoirs would afford them a supply of 5,000,000 gallons a day?—Their present storage will give them 3,000,000 gallons, and the storage which they are proposing to add to it would enable them to give 5,000,000 gallons from store.

544. And the flood water will give them the water?—The flood water will give them all the water which is required for filling these reservoirs.

545. Lord *Frederick Cavendish.*] We have been informed by Mr. Greaves that a complete system of intercepting sewers, so as to keep the water pure, would cut off about 3,000,000 gallons daily; if that diminished the supply, would the proposed new works provide an adequate supply, in your opinion?—I think that Mr. Greaves could hardly say that would cut off 3,000,000 gallons in dry weather. It must have been the average stream. Certainly the intercepting drains proposed by him would not diminish the available volume by 3,000,000 gallons.

546. Mr. *Clerk.*] Mr. Greaves said that if Mr. Bazalgette's scheme were carried out, the volume of the river in its ordinary state would be diminished by 3,000,000 gallons.

547. *Chairman* (to the *Witness*).] With reference to that statement of Mr. Greaves, what is your view?—As to the quantity of water which Mr. Bazalgette's proposed drainage scheme would abstract, I have not considered it, but I think that it is very likely that, taking the average of years, that might be the result which Mr. Greaves stated; but I have not considered it, and, therefore, I cannot give a precise answer.

548. Lord *Frederick Cavendish.*] Have you read the report of the Commissioners on the best means of preventing the pollution of the River Lea?—I have not read the report; I have read the recommendations and conclusions.

549. They recommend an extensive series of works to prevent the pollution of the river, do they not?—Yes.

550. If such a system were carried out, do you think the River Lea and the proposed new works would provide an adequate supply for the wants of the East London district?—That would depend upon the amount of storage required. My own opinion is that it is quite evident that the River Lea is not sufficient for the supply of the district within the East London area.

551. Even with the proposed new works?—As it is, and with the proposed new works, it is only just equivalent to the demands upon them, or which will be made upon them in a very short time.

552. Therefore, if any system of works was undertaken which diminished the supply, the proposed new works would not provide an adequate supply?—If any material diminution of the supply were to take place by the drainage works proposed, the East London Company could only be put in the same position as they stand in now as to quantity by increased storage. There is abundance of water for a much more greatly increased storage than that which they propose; but of course it is a very expensive thing to make storage reservoirs of any considerable size in a valley like that of the Lea.

553. Then you depend upon having every winter floods sufficient to fill very large reservoirs?—No doubt in the wet seasons of the year there is abundance of water to fill any reservoir that is proposed.

554. Mr. *Sclater-Booth.*] Do you go so far as to say that filtration through gravel and sand has no effect in purifying polluted water from matter held in solution?—No; it has a considerable effect, and it very materially improves water mechanically and chemically; but it does not entirely deprive water of chemical ingredients.

555. Colonel *Hogg.*] It does not remove organic impurities, does it?—It entirely removes organic impurities, except those which are held in solution.

556. *Chairman.*] Have you carefully considered Mr. Bazalgette's proposal, or any proposal, for intercepting the sewage of the Lea?—I have not; I know the general scope of the report from description; or at least I have not studied it.

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557. Then you cannot form an opinion as to the extent to which the River Lea would be diminished by those works?—I have not considered that point.

558. Mr. *Benyon.*] Is it necessary that it should be diminished at all if the intercepting drains were properly made with cement, and so on?—The intercepting drains may be so constructed as not to take any water except that which they are intended to take, viz., the foul water; but they are seldom so constructed; because, although the culverts themselves may be made so water-tight as not to allow water to escape outwards, or to allow it to come inwards, yet the excavation being made very much in the gravel, forms a natural drain on the outside of the new works; and, therefore, unless they put stops to prevent the water passing through, a great quantity of the land water is discharged.

559. *Chairman.*] In speaking of the quantity of water that may come into the reservoirs, have you taken into account the right of the New River Company to draw the water?—Yes; they are entitled to take *pari passu* 500 feet a minute below that point; but there will be abundance of flood water after the abstraction of it

560. Are you aware that they are entitled to take as much from the river as the East London Company are entitled to take?—I am aware of that.

561. Therefore the amount which you have to calculate upon would be half the amount over and above what is now taken, would it not?—The reservoir which is now proposed ot course might be taken, irrespective of that arrangement, to a considerable extent; because, it is only flood waters after both parties are satisfied with reference to the quantity which they are entitled to take by the existing arrangement, which would flow into those reservoirs which are proposed to be constructed. It would not interfere with the existing arrangement.

562. If the New River Company is entitled to take half the whole water of the river, the only amount which the East London Company could calculate upon taking would be half its present additional supply?—That is quite enough for the supply of the reservoirs. The floods are more than twice sufficient to fill those reservoirs; they are more than four, or five, or six, or perhaps more then ten times sufficient; therefore both parties in the ordinary way of taking water from the river would be entitled to take the water in the way in which it is now arranged. The flood water cannot be taken by storage by either of them.

563. When you speak of flood water, do you speak of water under ordinary rainfall as compared with dry weather?—Of course, whenever the river becomes swollen to an extent beyond that to which it can be usefully employed by mills, or can be taken by the existing means of abstraction; by the two companies the surplus may be considered as flood water.

564. Are those to be two separate reservoirs, or one large reservoir?—According to Mr. Greaves's designs, two large reservoirs.

565. So that one can be cleaned out while the other is being used?—Yes.

[The Witness withdrew.

Mr. *Clerk* stated that, under the Act of 1855, each of the two Companies was entitled to take 22,500,000 gallons a day, and that that quantity could not be obtained from the river in times of great drought.

The *Chairman* stated that if the Bill was passed it would be competent to the New River Company to make reservoirs, and upon giving notice to draw into their reservoirs as much as the East London Company drew into theirs; so that the legal right of the East London Company was to take one-half of the surplus water.

HENRY LETHEBY, Esq., M.B., sworn; Examined by Mr. *Clerk*.

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566. YOU, are the Professor of Chemistry, I believe, in the Medical College of the London Hospital?—I am

567. Are you the Medical Officer of Health and Chemical Analyst to the City of London?—I am.

568. You have had for many years, I believe, considerable experience in analysing water and studying the chemical composition of water, not only in London, but in different towns in England?—That is so.

569. I believe that you have frequently been called upon to make examinations of water, both for Parliamentary Committees, for Local Boards, and also for the Corporation of London?—Yes; for the last 20 years I have been engaged very much in that matter.

570. I believe that for many years past you have had to examine, monthly, the water supplied to the metropolis by all the Companies?—I have.

571. And the results, I believe, have been regularly published by the Metropolitan Association of Medical Officers of Health?—That is so.

572. Are you well acquainted with the quality of the East London water?—I am very well acquainted with it.

573. That water is, I believe, supplied to your laboratory at the London Hospital?—Yes; it is the only supply to my laboratory, which is at the London Hospital.

574. I believe that you have regularly examined the water, every month, for the last six years?—I have.

575. Is the water delivered to you bright and colourless, from the mains?—With very rare exceptions that is so. Now and then it is a little turbid, but not often.

576. Does that occur in any case?—It is a very rare circumstance. There have been occasions when there have been heavy floods in the river, when nearly the whole of the water in the metropolis, I may say, has been a little turbid.

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577. I believe that you have there a table showing the average composition of the East London water, for each of the last six years?—I have such a table.

578. Will you lay that table before the Committee?—Yes. [*The same was delivered in, and is as follows:—*]

TABLE A.—Average Composition of the East London Water as taken from the Reservoir at Lea Bridge, and from the Main at the London Hospital in each of the last Six Years (Letheby).

CONSTITUENTS PER GALLON.	1862.		1863.		1864.		1865.		1866.		1867.		Average.	
	Lea Bridge Reservoir.	Hospital Main.	Lea Bridge Reservoir.	Hospital Main.	Lea Bridge Reservoir.	Hospital Main.	Lea Bridge Reservoir.	Hospital Main.	Lea Bridge Reservoir.	Hospital Main.	Lea Bridge Reservoir.	Hospital Main.	Lea Bridge Reservoir.	Hospital Main.
	Grs.	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*
Carbonate of lime and magnesia -	13·75	13·38	13·12	12·77	12·00	11·98	11·97	11·90	13·02	12·77	13·39	13·08	12·88	12·66
Sulphate of lime -	3·52	3·41	29·3	2·88	3·29	3·39	2·97	2·89	3·57	3·49	3·46	3·33	3·29	3·23
Chloride of sodium	1·69	1·70	1·73	1·76	2·00	2·04	1·74	1·74	1·65	1·56	1·43	1·36	1·73	1·69
Alkaline nitrate -	1·81	1·64	1·63	1·59	1·37	1·28	1·15	1·08	1·07	1·23	1·63	1·57	1·44	1·40
Silica, alumina, and oxide of iron -	0·77	0·74	0·92	0·88	0·70	0·62	0·72	0·75	0·49	0·49	0·46	0·47	0·68	0·66
Organic and other volatile matter -	1·08	1·11	1·28	1·27	0·82	0·84	0·48	0·54	1·21	1·12	1·15	1·06	1·00	0·99
TOTAL solid matter per Gallon -	22·62	21·98	21·66	21·15	20·18	20·15	19·03	18·90	21·01	20·66	21·52	20·87	21·02	20·63

579. That gives the average composition of the East London water, as taken from the reservoir at Lea Bridge, and from the main at the London Hospital, in each of the last six years?—Yes.

580. Have you been in the habit of making two analyses each month?—Yes; I have had samples from the reservoir at Lea Bridge, and I have taken samples myself from the hospital main. I have compared them every month during the last six years, and the results of the comparison are represented in Table A.

581. I see, in the last column, which gives the average constituents, and so forth, that the water as delivered in the hospital main is in a purer condition than that which you took from the Lea Bridge reservoir?—That is always so. It is not only the case with the East London water, but I find it to be invariably the case with water supplied by every one of the London Companies. The water in the act of passing along the mains loses a certain portion of organic matter, and also a certain portion of carbonate of lime; and, therefore, the water which I get from the public mains is always a little better in quality than that which I get at the reservoirs of every one of the Companies.

582. *Chairman.*] Then this would seem to establish the proposition that running water does purify itself?—No doubt. This water is so well aërated and contains so large a proportion of atmospheric air, and especially of atmospheric oxygen, that it is very much purified.

583. Though it is in closed pipes?—Though it is in closed pipes. It is a proof of aëration when we find that oxydation take place in a closed pipe.

584. Mr. *Clerk.*] Looking at the results shown in that table, does it show that the water is good water for domestic consumption?—Yes; I regard this as a very good water indeed for domestic consumption. There is nothing whatsoever, as far as chemical evidence or chemical analysis can go, to discover anything at all in this water which renders it unfit for public use.

585. Is the quantity of organic matter small?—Yes; the quantity that is represented here represents more than the organic matter. It amounted, upon the average, to one grain in the gallon in the water from the reservoir; and in the water from the main it amounts to about ·99 of a grain; but that represents more than the organic matter; it represents other things which are driven off by the process, which we call incineration, or the application of heat; and I may say, relying upon the test of permanganate of potash, not one half of that is organic matter.

586. That is bringing us into a matter which is the subject of contest between yourself and Dr. Frankland, I believe?—Yes. There is no absolute process known to chemists which will expose the actual quantity and real proportion of organic matter in water. We are obliged to rely upon two processes, one is called the process of incineration, and the other is the permanganate of potash. I took both of them.

587. In the incineration process you evaporate all the water and examine the residuum, do you not?—That is so; and if the residuum is not perfectly dried by the process of submitting it to red heat, water will go off, and that is put down as organic matter.

588. You use that test in the first instance; do you also submit some of the water so taken from the different mains and reservoirs to the other test, by means of permanganate of potash?—I do.

589. Are you alone in that mode of estimating the quantity of organic matter?—In estimating the quantity; but in determining the relative proportions I am not alone. I believe that every chemist who has had any large experience in the analysis of water relies almost entirely upon the permanganate of potash test as evidence of the relative proportion of organic matter. I go a little further, and rely upon my experience in making it

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it evidence of the absolute proportion; but I stand alone in that respect.

590. That is to say, you have calculated and obtained a standard by which to estimate the quantity?—An empirical standard, founded entirely upon my own experience.

591. But other chemists agree with you that permanganate of potash is a good test of the relative quantity of organic matter in water, do they not?—As far as I know, every water analyst in England but one agrees with me.

592. Dr. Frankland does not agree with you?—Dr. Frankland does not agree with me. I can make an experiment, if it is at all a matter of interest to the Committee to see how the experiment is made.

593. I believe that to-morrow you are to endeavour to satisfy Captain Tyler that you take a correct view of this matter?—Yes. I do not believe that there is any real difference in our modes of investigation up to certain points; and then comes the question as to whether that empirical formula is the right one.

594. You stated that the organic matter, as appearing in this table, is not large for any domestic water?—Yes.

595. Has this organic and other volatile matter been determined by incineration only?—It has been determined by incineration only; and it represents, therefore, the maximum, or, as I call it, the exaggerated proportion.

596. Chloride of sodium is a matter which is usually indicative of the possible presence of animal refuse, is it not?—Yes. Unless waters are derived from wells near to the sea-shore, the chloride of sodium, or common salt, which is a very large constituent of sewage and of urine is always a very good exponent of the quality of water.

597. Is the quantity of chloride of sodium per gallon small?—It is small; it is below the average of the water supplied to towns, and of the running rivers of England. It amounts only to two grains in one case, and 1·7 grain is about the average proportion of it.

598. You have had occasion, I believe, from time to time to inspect the works of the Company at Old Ford, Lea Bridge, and at Walthamstow?—Yes; I have examined the works repeatedly, and I have traced the course of the river from the works at Heigham Hill to Hertford, and to Bishops Stortford.

599. Before we go to that, from your familiarity with works of this kind, do they seem to you to be well adapted for the purpose of purifying the water?—Very well. In the first place, they have a very large storage or subsiding reservoir at Walthamstow; and, as I am informed and believe, from the area of them, they hold nine days' water; therefore, there is nine days aëration of the water and subsidence, whereby all or most of the organic impurities of the water will subside; and then there is a run of about a mile and a half to Lea Bridge, where the water undergoes filtration through sand filters. I have seen those filters in operation, and they are constructed in accordance with the most approved plans, and they filter the water very well.

600. Is it the case that filtering through a well-constructed sand filter only removes the impurities which are held in suspension in the water?—No. The filtration through sand removes other than the suspended impurities. The suspended impurities rest upon the top of the filter; but we know that the water in traversing the sand loses a portion of its carbonate of lime; and the sand possesses the power of causing a more rapid oxydation of the organic matter than would take place otherwise. The water, therefore, flowing out of a sand filter is always less charged with total solid matter, and less charged with organic matter going into the filter, quite irrespective of that which is merely floating on the surface.

601. I ask that question because of the opinion expressed by Mr. Batemen, that filtration through sand only removed mechanical impurities; but you know from experience, and, I believe, from examining sands, that they do actually remove part of the organic matter held in solution?—Yes; I have a table here which shows the condition of all the London water before and after filtration, and there is no doubt of the removal of it. I have made the experiment so often that I have no doubt about it.

602. You have ascertained the comparative purity of the water at Lea Bridge and at the Hospital Main, have you not?—Yes.

603. Does that show you that there is no impurity coming into the water after it has been filtered at Lea Bridge?—It shows that. It shows that the water has improved, and that it has not deteriorated in quality; and, therefore, I say that nothing can have come into it of any moment from the time of its delivery into the main.

604. You were present, I believe, at Old Ford on the 24th of February, when the covered reservoirs were emptied at the request of Captain Tyler?—Yes; I was present.

605. And you then, I believe, took certain samples of the water from the bottom of the reservoir and the side of the reservoir?—Yes; I have a sample taken from the reservoir at the end of the pumping operation, when it had been brought down as low as possible.

606. I dare say you are aware that it is proposed to fill up that part of the reservoir at which there was any percolation?—Yes; this is a deposit (producing a bottle) which I took out of the reservoir. There is no organic matter in it.

607. There was certain water found spirting on one side of the covered reservoir, was there not?—Yes.

608. And you analyzed it?—Yes.

609. And it contained, I believe, rather more impurity than the filtered water at Lea Bridge?—It did.

610. *Chairman.*] That is in Table B?—That is in Table B. [*The same was delivered in, and is as follows:*—]

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TABLE B.—Composition of the Samples of Water from the East London Reservoirs at Old Ford, after the pumping operations had been completed, and of water spurting from the sides and slopes of the Reservoirs (*Letheby.*)

——	Water from the Reservoir at Old Ford at the end of the Pumping Operation.	Water Spurting from the Wall of the Reservoir.	Water Spurting from the Slope of the Reservoir at the North end.	Sample taken from Hospital Main in February.
Date of the sample, 24th February 1867.				
Total solid matter per gallon (grains) - - - - -	22·5	30·0	24·9	22·75
Of which organic and other matter lost by inceneration (grains) - - - - -	3·3	3·4	2·5	2·5
Organic matter, as estimated by amount of oxygen required to oxidise (grains) - - -	1·28	1·12	0·56	0·80
Hardness before boiling (degrees) - - - -	14·5	16·5	15·5	13·5
Hardness after boiling (degrees) - - - -	4·0	8·5	5·0	5·0

Mr. *Clerk.*] Any spurting of that kind would be entirely avoided by the filling in of that part of the reservoir, as Mr. Greaves proposes to do, where the spurting took place.

611. Does one of your tables show the results of analyses of the water from April 1866 to December 1866?—Yes; but before that I may refer to a table which shows the average composition of the water in each of the months for the last six years. The object is to ascertain whether, or not, there is any great variation in the quality of the water from month to month; that gives the average composition of the water in each of the last six years.—[*The same was delivered in, and is as follows:*—]

TABLE C.—Showing the average Composition of the East London Water taken from the Main of the London Hospital during each Month of the last Six Years (*Letheby*).

Constituents per Gallon.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average Yearly.
	Grs.	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grs.*	*Grains.*
Carbonate of lime and magnesia	13·5	13·4	13·2	13·3	12·2	11·9	11·6	11·2	12·2	12·3	13·7	13·3	12·6
Sulphate of lime - - -	3·9	3·8	3·8	3·3	2·7	2·6	2·4	2·7	2·6	3·2	3·4	4·1	3·2
Alkaline chloride - - -	1·8	1·7	1·7	1·7	1·6	1·6	1·6	1·7	1·6	1·7	1·7	1·9	1·7
Alkaline nitrate - - -	2·6	1·5	1·8	1·4	1·6	1·1	0·7	0·7	0·9	1·1	1·9	2·1	1·4
Silica, alumina, and oxide of iron - - - - -	0·9	0·8	0·7	0·6	0·6	0·6	0·6	0·5	0·6	0·7	0·7	0·8	0·7
Organic and other volatile matter - - - -	0·7	0·9	0·9	0·9	0·8	0·7	0·7	0·7	0·6	0·8	1·0	1·2	0·9
TOTAL Solid Matter per Gallon - - -	23·4	22·1	22·1	21·2	19·5	18·5	17·6	17·5	18·5	19·8	22·4	23·4	20·5

612. Does that table establish this: that there is always the greatest quantity of solid matter per gallon during the wet months of the year?—Yes, and that is so with regard, I believe, to every river in the kingdom.

613. I see January and December are the greatest; they are the same?—Yes.

614. It was 23·4 in each?—Yes.

615. Then it falls off in February, and reaches the minimum in July and August?—July, August, and September. When we have the least rain-fall, then we have the smallest proportion of solid matter in the gallon.

0.77.

616. Is that also true of the organic matter per gallon?—Yes, to some extent. The organic and other volatile matter does not vary so much, but it is so to a certain extent.

617. *Chairman.*] It is the organic matter that we

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we are to look to, I presume, for real impurity?—Yes, the organic matter is the thing to be looked to chiefly.

618. Mr. *Clerk.*] I see in November and December it is greater than in any other times of the year?—It is.

619. *Chairman.*] The floods, I suppose, in the autumn sweep the surface of the land after everything has withered and decayed which has been growing on the surface?—Yes; and another reason why we find the organic matter to be larger in quantity in the winter months than in the summer months is, that the process of oxydation and decomposition is not going on in the cold weather, and therefore there is more of that in the winter than in the summer time.

620. However, the rain coming after the fall of the leaf and the decay of all vegetable matter on the surface, would necessarily sweep a larger amount of vegetable matter into the river than at any other period of the year, when everything is growing and not decaying?—No doubt.

621. Then the decomposition is slower?—Yes.

622. Mr. *Clerk.*] Then Table D. is a table giving the composition of the East London Water during the cholera period of last year, or from April to December?—The cholera lasted pretty well throughout that time. My attention was especially directed to the quality of the London water during the cholera period, and this Table D. represents the quality of the water during that period.—[*The same was delivered in, and is as follows:*—]

TABLE D.—Composition of the East London Water taken from the London Hospital Main during the period from April to December 1866.

———	Carbonate of Lime and Magnesia.	Earthy Sulphate.	Alkaline Chloride.	Alkaline Nitrate.	Silica, Alumina, and Oxyde of Iron.	Oxidisable Organic Matter.	Total Solid Matter per Gallon.
1866:	*Grains.*	*Grains.*	*Grains.*	*Grains.*	*Grains.*	*Grains.*	*Grains.*
April	13·51	3·40	1·31	2·61	0·40	0·37	21·60
May	13·10	2·79	1·50	3·60	0·31	0·38	21·68
June	11·18	2·02	1·09	2·62	0·46	0·33	17·70
July	12·00	2·42	1·32	1·52	0·50	0·40	18·16
August	11·51	3·05	1·52	1·28	0·27	0·56	18·19
September	13·05	2·52	1·27	0·86	0·43	0·39	18·52
October	10·17	3·39	1·58	2·29	0·58	0·68	18·69
November	14·98	2·97	1·01	1·99	0·42	0·72	22·09
December	14·28	4·16	1·42	1·97	0·50	1·16	23·49
AVERAGE	12·64	2·97	1·34	2·08	0·43	0·55	20·01

623. The cholera was present, was it not, in the month of July and the beginning of August, until the rain came?—Yes.

624. *Chairman.*] Is this analysis taken at the hospital?—This is a sample that has been taken at the hospital main during the whole of that time, and as delivered to the public.

625. Mr. *Clerk.*] How is the organic matter here ascertained?—By inceneration in the same way.

626. Then I see it was less than half a grain, or only about one-third of a grain in April, May, and June, and in August it was half a grain, and then the wet weather came in August?—Yes; this I obtained by the permanganate of potash. It is headed "Oxydisable organic matter." This is the manner in which it was returned to the medical officers of the metropolis.

627. During all that time, did you find that the water of the East London Company still maintained its character as a good water for domestic use?—Yes; I could not, by chemical means, discover that there was anything in that water of an objectionable quality.

628. And you, during all that time, carried on your double analysis?—Yes; in fact, at that time I was making more than two analyses a month, because I had a good deal of anxiety on the question; and I was making a great many analyses at that time of the East London water.

629. Was an opinion spread at that time that the cholera in the east of London might be attributed, to some extent, to the East London Company's water?—Yes, that was so; and as the East London Company's water supplied the City of London, I felt it to be my duty to look into that matter.

630. And you found that during all that period the East London water was as good as its average quality?—Yes, it was; I could discover nothing different in it from what we had found at other times. It was a good water.

631. You are aware, no doubt, that a great deal of sewage is discharged from different towns on the banks of the River Lea, and of the Stort, one of the tributaries of the River Lea, into the river?—Yes.

632. In the passage of the water down the river for a distance, say of 20 or 25 miles, does a very large proportion of the sewage matter discharged into the river become oxydised?—That is so; and I may remark that with many, if not most of the rivers of England, after a run of 18 or 20 miles, or even less than that, it is not possible to discover, by chemical means, a trace of sewage in the water. For instance, between Coventry and Warwick, all the sewage is discharged into the river, and at Warwick they are taking it for the town supply; and, at the time I examined it, I could not, by any chemical analysis, find a trace of sewage in the water.

633. Of course, the heavier matters, which were in suspension, would be deposited in the bed of the river?—Yes, the heavier matters very rapidly subside; in the next place, the matters that are capable of undergoing oxydation are eaten by the fish,

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fish, and plants are very greedy in taking up all that is in solution; and then there comes the power of atmospheric oxydation; so that between all those operating circumstances the sewage is quickly gone.

634. And you give that as an instance to the Committee. The distance from Coventry to Warwick must be much less than 18 miles?—I think it is about nine or ten miles from Coventry to Warwick.

635. But great as the oxydising power of the air is upon running water, you still would, doubtless, recommend the adoption of such a scheme as that proposed by the Rivers Pollution Commission?—There is no doubt, although the power of oxydation and self-purification are very great, in respect of running water, it is highly necessary that the rivers of this country should be kept free from sewage.

636. Under such a scheme carried out as that suggested, and as is being done to the Thames, under the Act of 1866, would the River Lea become a first-class water?—I should think so. At the present time you cannot discover the sewage in a run of 20 miles from Bishops Stortford, where the river is so foul as really to alarm one. I was told by the man at the mill, a mile and a half below Bishops Stortford, that he could hardly live there in summer time; and yet, in a run of 20 miles, the sewage cannot be discovered by chemical analysis.

637. Mr. *Henry Baillie.*] How is it at the junction with the river?—Not very bad; it mixes with a large body, five times I should think its bulk, the Stort water being about one-fifth that of the Lea, and then it is not bad. It has undergone a great change between Bishops Stortford and the outfall.

638. Before it runs into the Lea?—Before it runs into the Lea.

639. Colonel *Hogg.*] Do you not think that such water must contain deleterious matter, although, chemically, you cannot find it out?—I think that does not necessarily follow. We do not, at the present moment, understand the immediate agents of disease; in all probability they are living germs. It is quite possible, though it is not probable, that a living germ might live in the water when other things would go; and those minute germs are not discoverable by the microscope or by any chemical process; therefore it is just possible, though there is no evidence at the present time of the probability.

640. Mr. *Clerk.*] This water has been used, I believe, for a great many years in the London Hospital?—It has been used ever since I have known the hospital, and I think that is pretty nearly a quarter of a century. It was used during the whole of the cholera time, when the hospital was full of cholera patients, and when there were nearly 900 people in the hospital; and there was not a single instance of cholera in the hospital, except those who were brought in as affected by the disease.

641. But none of the ordinary inmates of the hospital were affected by cholera?—Not one.

642. And not one of the attendants?—Not one. In the hospital I think there were about 487 people residing, excluding the cholera patients, and they were all taking the water exactly as it is delivered from the main, without any filtering process whatever, and not a single instance of cholera occurred.

643. I believe that you have had to think a good deal of this matter as regards the outburst of cholera in the east of London, and the water supplied by the company?—I have gone into that matter very carefully, and as deeply as it was possible to go into it, and the belief in my own mind was that there was no connection between the Old Ford reservoir, or the water delivered by the East London Company, and the cholera in London. I found that in the eastern part of London alone there was only a single house of all the houses supplied by the East London Water Company where the cholera was. It was in the houses supplied by the New River Company.

644. Mr. *Headlam.*] Did you examine the Temple water?—The Temple water was sent to me, or, at least, I was asked to examine it, but I was away; it was examined by Dr. Norel, I think.

645. *Chairman.*] Is that New River water?—No, that is pump water.

646. Mr. *Clerk.*] The East London water district does not extend to the Temple, does it?—No, it only takes the eastern boundary of the eastern part of the City.

647. In that district which you speak of, where only one death occurred in a house supplied with water from the East London Waterworks, were there a great number of deaths in the district immediately adjoining, which was supplied by another company?—Yes. I may say that altogether there were 103 cholera deaths in the City during the epidemic, and in the eastern division of the City there were 62 deaths; and there was only one house (and in that house, which was in Somerset-street, there were two deaths) out of all those in which the East London Company's water was taken.

648. And all the others were supplied by a company whose water has never been attacked on the score of purity, I mean the New River Company?—Yes; then again there are two workhouses which belong to the City, and about which I receive every week details in respect of the progress of the cholera. One of those workhouses is the City of London Workhouse situate at Bromley, in the Bow-road, where they did not take a drop of East London water, and there they were decimated in one week by cholera.

649. *Chairman.*] Were they supplied from a draw-well?—Yes. The other workhouse is the West London Workhouse at Hackney, and they did take the East London water, and they had not a death.

650. Do they draw the water from the lower supply or the upper?—I do not know about that.

651. Mr. *Clerk.*] But I dare say that you are aware that at certain parts of the district of the East London Company, take Clapton, for instance, which is solely supplied from Old Ford, there were no deaths at all?—There were no deaths at all. The only houses in London where we know, as far as my inquiries have gone, that the Old Ford water was given, were at Stamford Hill and Clapton, and they had no deaths from cholera. Those were the only houses where, beyond all doubt, that water was taken. There was another point which struck my attention, and into which I went very much, with respect to the possible connection of the cholera with the water. I found that there was no relation whatever between the time of the outbreak and the distribution of the water. Supposing that we

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put it thus—assuming for a moment that the water supplied by the East London Company contained the poison germ; it might be arsenic, for example, or alcohol, in the place of cholera, distributed over the district, there would be something like uniformity in the outbreak of the disease; but a month elapsed between the date of the appearance of the disease in one part of the district and another. There was no connection of time, so to speak, between the distribution and the outbreak.

652. Nor in the culminating of the disease?—Nor in the culminating of the disease. I have taken them week by week throughout the whole time of the cholera, and I find no connection either in the time of the outbreak, in the duration of the disease, in the intensity of the disease, or in the time of the intensity of the disease.

653. Now I believe that you have tables showing the number of deaths per 10,000 of the population in different parts of the eastern district of London?—Yes.

654. Was the proportion of deaths per 1,000 or 10,000 much greater in districts not supplied by the East London Company, than in districts which were so supplied?—Yes, in Whitechapel, in the City of London, and about the western division, where the cholera existed, and in many streets of the streets where the New River water only was taken, the mortality was greater than in the next street where the East London water was taken.

655. And were those localities under much the same conditions with regard to crowding?—I think so.

656. And as to the character of the inhabitants?—Yes, I think that they were very much alike in those respects.

657. I believe in the whole district the mortality was about 32·5 per 10,000?—In the whole district of Whitechapel, the mortality from cholera, according to Mr. Liddell, who is the medical officer of that district, was 32·5 per 10,000 of the inhabitants, whereas in a yard called Blue Anchor-yard, which is supplied with New River water only, the mortality was 144·9 per 10,000.

658. *Chairman.*] At what date was that?—During nearly the whole of the epidemic.

659. Mr. *Clerk.*] Did you find from inquiry and from the reports of the medical officers of the different districts, that the mortality was much less among the water-drinkers, that is the abstinence people?—Yes; I hold in my hand a report of the medical officer of the Limehouse district, where the cholera was very bad. He, like myself, went very much into the water question; and he thought, of course, that if the water was the cause of cholera, he should find it among teetotalers, but he found the mortality much less among them.

660. Mr. *Headlam.*] Was the proportion larger among gin-drinkers?—It was; and I find also that during the whole period of the epidemic the mortality was larger on Tuesday, which would seem to indicate that the excesses of Saturday had laid them open to the cholera, and they died on Tuesday.

661. *Chairman.*] That coincides with the history of cholera in India, where the people get the cholera after they have been drinking and indulging in excesses?—Yes, I think that is the tendency everywhere.

662. Mr. *Clerk.*] Did you observe circumstances in your examinations which would account for the prevalence of cholera in those East London districts, independently of any question of water supply?—Yes, East London is a peculiarly low-lying district.

663. *Chairman.*] I see in the papers which we have from the Registrar General, at page 11 of his paper as to the facts, these words in the Table at the bottom of the page: "By East London from Old Ford Reservoir." And then there is this at note D.: "Comprising Bethnal-green, Whitechapel, St. George's-in-the-East, Stepney, Mile-End Old Town, and Poplar"?—Yes.

> The *Chairman* intimated that it was desirable that some explanation of this should be given.

664. Mr. *Clerk* (to Mr. *Greaves*).] Is this a correct supposition on the part of the Registrar General that those districts were supplied from the Old Ford reservoir, comprising Bethnal-green, Whitechapel, St. George's-in-the-East, Stepney, Mile-End Old Town, and Poplar.

665. *Chairman* (to Mr. *Greaves*).] Are the districts of the east end of London exclusively supplied from the Old Ford reservoir?—Those are the districts which are most probably supplied from the Old Ford reservoir. I cannot, nor can anyone else, say that they were supplied exclusively, but in all probability the supposition that they were so supplied is correct.

666. And that the districts supplied from the New River and from the East London reservoir by the Lea Bridge source of supply, comprised Hackney and Shoreditch.

> Dr. *Letheby.*] The Registrar General has taken it for granted that the registration district of East London is supplied by East London water, but he makes a mistake there, because the larger portion of the East London district is supplied by the New River Company.
>
> *Chairman.*] But this is a different thing; this says that the district supplied from the Lea Bridge reservoir is Hackney and Shoreditch, and the rest of the East London district.
>
> Mr. *Greaves.*] If the word Haggerstone had stood where the words "East London" are, that would have been correct.

667. Mr. *Clerk* (to Mr. *Greaves*).] The only districts which I believe you know are supplied exclusively with Old Ford water, are Stamford-hill and Upper Clapton?—Stamford-hill and Upper Clapton, which are one district, and Wanstead, Walthamstow, and Woodford, which are another district, are specially supplied by particular engines from Old Ford.

668. Bethnal-green, Whitechapel, St. George's-in-the-East, Stepney, Mile-End Old Town, and Poplar are supplied both from Old Ford and from Lea Bridge, are they not?—They are.

669. The waters are mixed in the mains?—Yes; but that district may be called the Old Ford district, rather than any other.

670. *Chairman* (to Mr. *Greaves*).] But are there points of junction throughout with the other mains at the extremities of those districts?—On the borders of that district there is a fluctuating service which may be supplied from either; and also that district which was supplied, and is supplied at night, from Lea Bridge.

671. Then there ought to be added to this the district which you have mentioned, of Stamford-hill,

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hill, Clapton, Wanstead, Walthamstow, and Woodford; those were also exclusively supplied from the Old Ford mains?—They were.

672. Mr. *Clerk* (to Dr. *Letheby*).] In these districts, I believe that the cholera prevailed very little indeed?—Yes; but there is an addition which should be made to this Table. A column is wanting for the purpose of elucidating the facts, and you will find it to a certain extent set forth at page 24 of these reports. I mean the effect of elevation upon the intensity of the cholera. At every visitation in London it has been found that the higher level districts have suffered less from cholera than the low level districts. There should have been added, therefore, to this Table, for the purpose of making it clear, the number of feet of elevation of those several districts. It would then have been found that, upon this occasion of the epidemic, as upon former occasions, the low-lying districts had suffered most. If you were to compare, for example, Stamford-hill, which is supplied by Old Ford, and Clapton and Haggerstone, and those high elevations with the middle districts of Hackney, and so on, and Bethnal-green, it would have been found that there had been less mortality (in fact, there was none at all at Stamford-hill and Clapton) than in the middle districts, and less in the middle districts than in the low ones.

673. *Chairman.*] Do you understand all those elevations to be above Trinity high-water mark?—Yes, that is so; and therefore I say that though the fact of the East London Company supplying the low-lying districts is coincident with the fact that the cholera decimated those districts, as much and more must be said as to its being dependent upon the fact of the district being low-lying as upon anything else. Then again those districts are districts where we know that the poor are overcrowded, and that there is probably more poverty and dissipation and everything which can tend to aggravate a disease, than in the other districts in which we found it to be less severe.

674. Mr. *Clerk.*] In addition to the fact of those districts where the cholera most extensively prevailed being the lowest, was it also the case that the district where the drainage works were in the least favourable condition?—Yes.

675. I think that at page 7 in the return there is this statement: "In reply to an inquiry, Mr. Bazalgette has favoured the Registrar General with a short account of the drainage of the cholera district. 'It is unfortunately just the locality where our main drainage works are not complete. The low level sewer is constructed through the locality, but the pumping station at Abbey Mills will not be completed until next summer. Therefore the drainage of the district does not yet flow into the low level sewer. We are deodorising the sewers and gullies freely with chloride of lime, and to-morrow I shall recommend the Board to erect a temporary pumping station at Abbey Mills to lift the sewage of this district into the Northern Outfall Sewer. This can be accomplished in about three weeks time.'" That was in the month of August, after the cholera had culminated, was it not?—The cholera in London was the most severe in the weeks ending the 4th and 11th of August.

676. And therefore this plan of pumping must have been complete in about three weeks time from the date of that letter, which would be somewhere about the end of August?—Yes.

677. Did you find the cholera prevailing more extensively in streets according to their position with reference to the points of the compass?—Yes, I have had that inquired into. I was anxious to know whether or not the drainage of the locality or the circulation of the air in the locality and in the streets that were in the direction of the prevailing wind affected the question, and whether we should find less cholera in them than on other occasions, because we were quite in the dark as to the cause of the intensity of the disease in that quarter of London; and I found, upon looking at them upon the map, that nearly all the streets, or by very far the largest proportion of them in which the cholera was most severe, ran east and west, and the winds at that time were not in that direction. They would seem, therefore, not to be well ventilated.

Cross-examined by Mr. *Cripps*.

678. You say that you have not traced any direct connection between the water supply of East London and the cholera?—Yes.

679. But you would think it very probable, would you not, as a general proposition that cholera, or an epidemic disease of that kind, might be increased if the water was in any way impure?—I have no doubt that cholera may be and has been propagated by water, particularly with regard to our surface wells; and that might be established also with regard to a public water supply; but I have no doubt that water may be the means of propagating cholera.

680. I dare say that you know remarkable instances of the tracing of cholera to wells being contaminated by sewage and things of that sort?—During the present epidemic I have myself been able to trace cholera to wells. There was a remarkable case at Gravesend, where water smelt on the Sunday, and the people were attacked on Monday and Tuesday. I had to analyze the water there, and I have no doubt that the water was the cause of the cholera there.

681. You spoke, did you not, of the water supplied to the London Hospital being the East London water which was used there?—Yes.

682. I suppose that you have no other water to use?—None.

683. In your opinion, as a position, would it not make a very great deal of difference how the party who used the water was fed, clothed, or cared for, as to whether the water would have a bad effect upon him or not?—Yes, all those circumstances which tend to decrease the vital power; as, for example, dissipation, want of food, want of rest, or a general poverty of the system from any cause whatever, will render an individual more susceptible of the disease than a stronger man.

684. And I imagine that with reference to the persons employed by you generally in the East London Hospital, they were well cared for, so as to render them as little susceptible to cholera as possible?—Yes, but many of the patients might be said to be in a condition to be liable to it from being prostrated.

685. But you would not from that reason infer, because parties at the London Hospital, such as nurses and persons of that kind, did not take cholera, that they might have been drinking something which might have aided cholera under

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less fortunate circumstances?—Certainly not. If I had only that fact to go by I should not think much of it, but I put a large number of circumstances together, and upon them I base my conclusions.

686. In fact, a large number of the persons supplied by the East London Waterworks would be persons of a very poor condition of life, would they not?—Very.

687. Persons suffering privations of many kinds?—Yes.

688. And, perhaps, with insufficient food?—Yes.

689. And so far predisposed to take cholera, if they took water in which there was anything at all deleterious?—Yes. The district in which the cholera was most prevalent was a poor district, and the individuals were very susceptible, no doubt, to the action of the poison.

690. The filtration of the water, you say, removes what you call the organic impurities of the water?—Yes; a portion of that which is in solution, as well as that which is suspended.

691. But you would not say that the filtration of the water would remove all organic impurities, would you?—You might have such filtration through sand, as that in all probability the whole of the organic matter might be taken away; but under common circumstances it would not be so.

692. In fact, the water filtered does not lose all its organic impurity?—No; three feet of sand will not do it.

693. Your chemical analysis enables you to detect certain chemical properties of water; but in reference to organic impurities, you are not able to ascertain whether there may be in that water what may be called choleraic matter?—No.

694. Therefore the chemical analysis, though it is good up to a certain point, fails when you come to apply it in that way?—Yes. There are no absolute means, either microscopical or chemical, to enable us to discover the nature of the organic matter which is held in solution.

695. *Chairman.*] You cannot discover animalculæ in water by a chemical process, can you?—Not by a chemical process; but by a microscopical process we can do so.

696. Mr. *Cripps.*] At the top of page 7, Dr. Frankland, speaking of the organic matter in water, says this: "The above results show that in this respect the water supplied on the 1st of August is considerably better than that supplied on the 1st of July, when the amount of this ingredient was markedly above the average. Chemical analysis, therefore, although it shows a larger quantity of organic matter than ought to be contained in water used for drinking purposes, does not reveal any exceptional degree of pollution in this water. It must be borne in mind, however, that chemical investigation is utterly unable to detect the presence of choleraic poison amongst the organic impurities of water, and there can be no doubt that this poison may be present in quantity fatal to the consumer, though far too minute to be detected by the most delicate chemical research;" you would assent to that, would you not?—That is rather strongly put; but as a general proposition it is correct enough. I should think that if the poison were present in a quantity to be fatal to the consumer, the chemist would be able to detect it; but it may be there in sufficient quantity to be injurious.

697. *Chairman.*] How can he detect it if it is not there?—The question arises thus: the chemist cannot discover choleraic poison; the chemist supposes it to be there, and he cannot discover it.

698. He has no test to apply to discover its presence?—There is no test.

699. Assuming that there can be choleraic poison in the water, as you do not know what it is, you have no chemical test to apply to it to ascertain its presence?—That is so. We have no chemical test to know it.

700. Mr. *Cripps.*] That is to say that it might be there, and you could not detect it?—That is so.

701. You spoke of the amount of sewage which may be got rid of as the water passes off; but with all that chemical knowledge you would think it very desirable, would you not, if you were going to use the water of a river for drinking purposes, to exclude the sewage altogether?—I have no doubt about it. I do not think it a desirable or proper thing that the rivers should be, notwithstanding their self-purifying powers, the receptacles of sewage.

702. Then I may infer from that, that in your opinion deleterious matter may remain in water which has been polluted by sewage, although you cannot discover it chemically?—I said that that was possible, although it does not appear to me that it is very probable, because it is only assuming one condition of thing of which we know nothing, and that is, that the agent of these special zymotic diseases, as they are termed, is a living thing. If those diseases are brought about by the action of putrefying matter on the human body, then I say that the putrefying matter cannot exist in running water for any distance; but if you assume that it is a living germ, then I say that it is possible that it may be in the water without being discovered.

703. And you know that the Lea is very much polluted, especially at the point which you mentioned, viz., Bishops Stortford?—Yes; at least the Stort is polluted very much.

704. And houses are increasing in the valley of the Lea, are they not?—Yes, I should think so. Bishops Stortford is a very flourishing town, and I should think it is one which is likely to be increasing.

705. Do you know that they stir up the sewage deposit in the stream there, so as to send it down the stream in times of flood?—I do not know it, but I should think it is very probable. The river is in a frightful state there.

706. Then you would think it advisable to devise something to protect the river from the increased sewage which is likely to flow into it from increased population, as well as from what already exists?—That is very desirable.

Re-examined by Mr. *Clerk.*

707. With regard to the power of detecting an unknown thing; when you analysed this well water, at Gravesend, was there a very large amount of deleterious matter found in the water?—Yes; the water itself, at the beginning, when it was warmed, had a distinct odour of sewage; and when it was analysed, the presence of sewage was unquestionable.

708. Now, even supposing that no deleterious matter should exist, in consequence of the oxydisation of the sewage, ought sewage to be removed

from water, in order that the consumer should not have the unpleasant idea that he is drinking water which has had sewage in it?—Yes; that is a very great point, I think. The feeling that all people would have, and very naturally, in respect of the use of water which is receiving at any time sewage, is one that would render it very desirable that the sewage should be kept out of the water, although we may carry that notion a great deal too far, and say, with respect to the fruit we eat, that it probably has had its origin in sewage, or some such thing as that.

709. With regard to the condition of the people in the east of London, you have given us already certain cases where the cholera was more rife in districts not supplied by the East London Company, but in districts supplied by another Company?—Yes.

710. In those districts where that was the case, like that Blue Anchor-yard, were the persons in the East London district in as poor a condition as those supplied by the New River Company?—Their condition was exactly parallel with that of their neighbours who had suffered more from the disease in the east end of the City of London, about which I can speak more authoritatively than I can of Mr. Liddell's district. The inhabitants of the houses supplied by the East London Water Company were not a bit better than those living in houses supplied by the New River Company; notwithstanding this, those who were supplied by the New River Company suffered much more than those who were supplied by the East London Company.

711. Taking your experience after this great length of time among the inhabitants of this district, can you tell us whether, as a rule, the poorer classes and the most feeble individuals are generally water-drinkers in that district?—I should think they are not in that district; they are generally gin-drinkers, I think.

712. They are not great consumers of water?—They are not great consumers of water.

713. Mr. *Kekewich*.] Is it not now an acknowledged fact, that the infection of cholera is propagated chiefly by the discharges?—That is now, I think, a very well established fact.

714. And in no other way?—I do not think it is propagated in any other way. Of course, all those diseases must have an origin, and there may be spontaneous origins of them. Small-pox and other diseases are undoubtedly communicable by means of matter which we can take from one patient and give to another; but as a rule, as in the case of small-pox, the matter discharged from the pustules of the body are the medium of communication, and the real agents of the disease; and so, I think, in cholera, the matter discharged from the body is the real agent of disease.

715. You would conclude, therefore, that where sewage is imperfectly carried off, cholera is more likely to spread?—Yes, where water is drunk with sewage in it, whether it be well water or river water, provided that sewage has only recently entered it. We do not know, at the present time, how long the discharges from the body may retain their morbific action; they may lose that action in the course of a week, for ought we know; but that matter discharged into a well of water, or into a running stream, and taken a short time after the discharge, may cause disease.

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716. Before it is diluted?—Before it is diluted, or even after dilution.

717. You have seen the 35th page in this report, in which there is a pretty strong inference drawn that the spread of the cholera in the lower district of London was owing to the supply of the East London Water Company. There is a comparison drawn between the districts supplied by the New River Company and those supplied by the East London Water Company in favour of the New River Company as against the East London Company?—I might make an exact comparison of a similar kind; I might say there are two gas companies supplying the east end of London, and it is a remarkable fact, that in the district supplied by the Commercial Company cholera has existed, and in another district, supplied by the City of London Company, the cholera has not existed. There is just the same amount of coincidence and parallelism between those two cases as between the water companies.

718. You conclude that the great prevalence of cholera in those districts was owing to the low position of the neighbourhood, and also probably to the manner of living and the dirty habits of the inhabitants?—No doubt; I have noticed in my own district, in the east end of London, that when the cholera appears in a poor house it goes further in that house, owing to the dirty habits of the people, who may let some of the matter get into contact with their hands, and so it spreads.

719. I believe that was the case in Woolwich, where the spread of cholera was very rapid?—I do not know enough to speak of that.

720. Colonel *Hogg*.] With regard to that letter of Mr. Bazalgette's, did you find a decrease of cholera after the erection of the new station at Abbey Pumping Mills?—It was so; the cholera had begun to decline before that time, but the date of it was, I think, at that period. There is another letter from Mr. Bazalgette informing the Registrar General of the fact, that the pumping has been completed, but I cannot put my hand upon it at the moment; the cholera was, at the time, fast passing away.

721. Do you think any filtration, excepting that by animal charcoal, will completely purify water?—I do not; I believe animal charcoal to be the only means by which water can be completely purified; but such a system of purification is altogether inapplicable at the works; it should be done at the point of distribution.

722. Would it be too expensive?—It would be not only too expensive, but it is ineffective; because, if ever so pure and good water were supplied to the poor people generally, the filthy condition of the receptacles for it would render that water impure again.

723. Do you think that water deteriorates when it gets into the house from what it was in the pipes?—In the poorer houses the water-butts are almost always in close proximity to the water-closets, and the emanations from the water-closet are, no doubt, absorbed by that water.

724. That is not the case in better houses, is it?—In better houses they are more particular; but a very large proportion of the water supplied by the water companies is for watering streets, and so on, for which filtering the water is an expensive and useless process.

725. Sand is sufficient for all that, is it not?—Sand is sufficient for all that, and the public should filter it at their own houses.

726. There

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726. There are three feet of sand, I think?—There are three feet of sand on the filter-beds.

727. Mr. *Headlam.*] As I understand you, amongst the constituents of this East London water, chloride of sodium is the only one which proves in any way the existence of sewage matter?—That is the only one upon which we can rely. As to organic matter, we do not know whence it comes; but the chloride of sodium must, no doubt, I think, have had its origin in matters discharged from the animal body.

728. And there is no larger proportion of that in this East London water, as compared with that supplied by other companies?—There is not.

729. I suppose in pure rain water there is no chloride of sodium?—Not unless it be by the sea-shore, and then the rain water brings down a certain quantity of the spray of the sea, which is physically suspended in the atmosphere.

730. Does rain water contain anything else?—It contains nitrates, and organic matter, and foul matter in towns, sometimes.

731. Do you think it is consistent with the extreme impurity of which we have heard as regards the state of the Lea higher up, that the water should be as pure as you find it in those analyses?—I think it is consistent, because, as I say, the processes of self-purification are so powerful. The fish and the plants are using up all this matter. The common salt contained in the water, and which no doubt has had its origin in sewage, is taken up by the plants.

732. Supposing you were to take the sewage at Barking Creek as it comes out from the London districts, and that sewage were to run for a certain distance through a gravelly country, for how long would it run before it became pure water?—In the first place, sewage alone requires a very long time to undergo the process of self-purification. The sewage discharged into the Stort at Bishops Stortford does not render the water of the river in the condition of the sewage discharged at Barking Creek. We consider, in the first place, that sewage must be mixed with 20 times its bulk of good water in order to be in a condition to undergo oxydation; then a flow of nine miles will deodorize it.

733. A mixture of 20 to 1 of pure water, and then nine miles flow, will make sewage pure?—So pure that I should not have the least hesitation in using it.

734. Without the mixture of 20 to 1 what would be its condition?—Then it would probably want nine times 20 miles to run, or something like that.

735. It is merely a question of degree?—Just so; the atmosphere is not capable of doing an unlimited amount of work.

736. If you only gave it space enough, the sewage from London would become perfectly pure water in time, after running through a considerable distance?—Yes; the first plants to grow in it would be the sewage fungus. They would effect a great purification. Then there would be the river ranunculus, and then plants like water-cresses, and then the flags which you see growing on the river banks, and then the American weed; and we know step by step, as those plants make their appearance, what is the purity of that water, and in the end there would be nothing there. I believe the main sewer by Hackney is tapped by some of the water-cress people, and they let it run through the water-cress beds; and when it comes out it is so pure as to be fit for domestic purposes.

737. *Chairman.*] Have you been down the Thames?—Yes, several times.

738. Have you observed that, after passing through a great mass of weeds, the river is sensibly purer than after passing through a large town?—In the Upper Thames it is so.

739. Are you aware that the cholera reached its maximum in the week ending the 4th of August?—I have taken the numbers down week by week as they have been published, and if you take the average of all London it reached its maximum then; but taking different districts you will find that the mortality was at its maximum in the week ending the 28th of July in Limehouse, and also in Mile End Old Town, and also at Bow, and also at Poplar. It reached its maximum in the next week, that is, the week ending the 4th of August, in most of the other places; but it was in the week following, that is, the week ending the 11th of August, that again it reached its maximum in St. George's-in-the-East; therefore, there were three different maximum points in the different parts of London.

740. Do you know whether the change for the better coincided with the fall of rain in the different parts of London?—I have not noticed it.

741. Do you know that the rain began to fall in the 31st week of the year, the weather having been perfectly dry for the three weeks preceding?—What was the date of the 31st week?

742. It would be the month of August, would it not?—It was at its maximum at some places a fortnight before that; it began to decline a fortnight before that in Bow, Limehouse, Poplar, and Mile End Old Town.

743. Then you cannot ascribe its increase or diminution to any particular cause?—No; the experience we have had in this last visitation has thrown no light on the origin of cholera, except two things: first, that those in an elevated situation are protected to a large extent, and that those in the low-lying districts suffer most; and in the next place, it is found that the general habits of the people, and particularly the fact of dissipation, I think, has a good deal to do with the propagation of disease, and that accounts for the severity of it on Tuesdays.

744. Would you consider it a most important means for the diminution of cholera to secure a good supply of water to the waterclosets of the houses, so well as to keep them perfectly clean?—No doubt. Until the Sanitary Act of 1866, in the City of London, was passed, we had no power of ordering water to be laid on in the waterclosets, but we have it now.

745. Mr. *Headlam.*] When the cholera first came to this country it came in a regular progress across Europe, did it not?—It did; but the cholera in each of the former visitations, in 1833, 1849, and 1854, took from three to four years to come from India to us, and it entered always by St. Petersburg, and came down the Baltic, and so came into one or other of our ports; but it has come down the Mediterranean to us on this occasion, and has taken a different course, and has behaved in a very different manner to that in which it behaved on former occasions.

746. *Chairman.*] Have you examined at all into the suggestion that the cholera was brought into the east end of London by a shipping from Germany?—Yes. The first patient who was attacked in the east end of London was a sailor who

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who came from Holland with a vessel full of fruit. He came from an infected port and he brought the disease there, and the first person who afterwards caught it was a woman who I think attended him, and who was brought into the London Hospital, and the cholera spread from that point.

747. Then there is as much reason to suppose that that was the cause as anything else, is there not?—Yes, no doubt; you must have a beginning. I see no reason to suppose that sewage and water produces cholera, except that sewage contains a cholera discharge; otherwise we should be always having cholera.

748. Do you think that the outbreak of cholera can be so connected with the state of the water in particular districts as to lead anybody to infer that the two things are associated with one another?—I do not know anything to warrant that supposition. At the same time I am willing to admit that water is a powerful agent in carrying disease, by communicating discharges.

749. Have you analysed the water in the Lea above the point where the company takes its supply?—I think that I have analysed it at Hertford.

750. Immediately above the point?—Not immediately above it; I have taken it from the reservoir before it is filtered at Walthamstow.

751. Have you the results of that analysis?—I have the results of it. I took a sample on the 12th of January of this year, another sample on the 14th of January; one of the unfiltered water before it entered the main, and the other at the main, where it entered the hospital.

752. In what state was the water then?—There were floods in the river, and the water was very turbid. We had had wet weather before.

753. Had we had much rain before that?—We had had a great deal of rain during the last six months; all the rivers had been flooded and turbid.

754. That would hardly be a fair average, would it?—No; but we took it at the worst time. I found the unfiltered water to contain 24 grains of solid matter in a gallon, and that the filtered water contained 23·6 grains of solid matter. The suspended matter, which gave turbidity to the water when unfiltered, was rather more than half a grain; and in the filtered water it was scarcely discoverable.

755. You have not taken it in any other time?—No.

756. Mr. *Kekewich.*] You hardly recollect the cholera in 1832, do you?—I had just entered the profession at that time, and had a great deal to do with the cholera.

757. Have you observed, from any return, whether the cholera was then more prevalent in those districts in which it has since been prevalent?—That has been so on every occasion. The Registrar General has noted it upon every occasion. His table, in fact, which I referred to just now, gives you the relative intensity of the disease at those several elevations at each visitation.

758. *Chairman.*] On those occasions people who were actually at work on the River Thames have not been attacked with cholera?—They have not.

759. Therefore it would seem to result from the saturation and stagnation of the soil rather than from any other cause, would it not?—The emanations from rivers do not seem to produce it, because those on the river do not suffer from it very severely.

760. Mr. *Clerk.*] In the year 1849 was not the cholera very bad in the Tower districts from those open ditches?—That was so. In the last visitation there was hardly any cholera at all in that district; it was looked upon as one of the healthiest districts in London.

761. Have you found in districts where small-pox, typhus, and other diseases have prevailed as epidemics, that there also cholera has succeeded them with great virulence?—Yes.

762. Mr. *Benyon.*] With regard to that observation which you made as to Blue Anchor-yard, the per-centage was very large; I think that it was 144·9 per 10,000?—It was nearly 145 per 10,000; whereas in the neighbourhood it was only half that per-centage.

763. Do you know the actual number of people who were living in Blue Anchor-yard at that time?—Mr. Liddell has taken the numbers, but I have not taken them, and I do not remember the number living in the yard. I know the yard very well, and I should think that there must be 700 or 800 people living there.

764. *Chairman.*] I think that 432·89 was the proportion of the deaths in the Whitechapel district?—Yes.

765. Colonel *Hogg.*] You told the Chairman, did you not, that you did not think that sewage and water would cause cholera?—Sewage and water, if the sewage contains the discharges from a cholera patient; and if the water tainted with such sewage be drunk soon after the discharge from the body, I believe would produce the disease.

766. There is a curious letter at page 18, to which I would call your attention, in which it is stated that cholera was caused by two people drinking water which came out of a well, and which had been boiled; have you seen that letter?—I have.

[The Witness withdrew.

Mr. *Clerk* stated that that was the case for the Bill.

Mr. *Henry James* stated, with regard to the opposition of Mr. Bosanquet, that it had been arranged to refer the matter to the arbitration of an eminent member of the bar to decide what rights in the water, if any, existed.

Mr. *Cripps* was heard to address the Committee, on behalf of the Metropolitan Board of Works, against the Bill.

Mr. JOSEPH WILLIAM BAZALGETTE, sworn; Examined by Mr. *Wilkinson*.

Mr. *J. W. Bazalgette.*

767. You are Engineer to the Metropolitan Board of Works?—I am.

768. And in that capacity it is your duty to examine and report upon all Bills in Parliament affecting the department under your control, is it not?—Yes.

769. You have discharged that duty with reference to the present Bill, I believe?—Yes.

770. And I believe that you presented to the Metropolitan Board of Works a Report upon that, among other Bills, in February of the present year?—I did.

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771. At that time the Bill proposed a great many other matters, did it not, which have been since struck out?—Yes.

772. Therefore, without referring to those matters, did you report particularly upon the portion of the Bill which proposed to continue the intercepting channel which they now already have constructed, to a higher point?—Yes.

773. Did you report, with reference to those works of interception, that the works did not appear to be such as would purify the water of the Lea within the Metropolis; and that, to be effective, they should be of a more comprehensive character?—I did.

774. Has the alteration made in the Bill, by striking out altogether those proposed works, in any degree removed your objection to the Bill?—No, it has increased it.

775. It is suggested that the omission is made in order to give facility for a more comprehensive scheme being carried out: is it your opinion that, under such circumstances, and those parts of the Bill being omitted, it would be expedient to grant the other privileges for increased supply and increased storage, which are asked?—I think that it would be expedient first to take measures to purify the water, before measures for an increased supply are sanctioned.

776. You think that purification should take the precedence?—I do.

777. In any works which may hereafter be contemplated for purification, do you consider that the East London Company would be a party mainly and most materially interested?—Yes; I think that the East London Company are more deeply interested in carrying out any works for purification in that distrsct than any other body.

778. If that be so, you would naturally expect from them a very considerable contribution to any plan for such purification, would you not?—I should.

779. Would, in your judgment, the granting them the increased privileges which are now sought, relieve it from the liability which they themselves at first undertook, tend to lessen very much the interest which they would have in carrying out a system of purification?—I should fear that if it were done, no works of purification would be carried out for many years, if ever.

780. Upon the subject of purification, of course, as you do not profess to be a chemist you have made no analysis of water, or anything of that sort, have you?—No.

781. But you have had, I think, considerable official experience of the importance of purity of water, with respect especially to the outbreak of cholera which occurred?—Yes.

782. Will you state to the Committee, if you please, the experience which you have so had, especially directing your attention to an outbreak which occurred in the Golden-square district?—I remember very well the outbreak of cholera in the neighbourhood of Golden-square, about 12 years ago. There were various theories as to the cause, and there was an inquiry into the subject by medical gentlemen appointed by the Government, and others; and the result of that investigation was reported by them to the effect that all persons who had drunk the water from a public pump, in a street of which I forget the name, but it was Broad-street, I think, were attacked by cholera. First, they ascertained that a sewer, a few years before, had been constructed in that street, near to the pump, in a gravelly soil, and that percolation had taken place from the sewer into the pump-well; and a remarkable feature of the case was that the water was very bright and clear, to all appearance, but it was very fatal. Then I have a very clear recollection of attending an inquest upon certain deaths from cholera, in the Stockwell-road, near to Clapham Rise. The persons in almost every house in a certain terrace there were affected with cholera; and it was clearly attributable to wells being sunk in the gravel, and to cesspools having been sunk into the same soil, and to percolation having taken place from one to the other. And very many other cases of the same kind have come under my knowledge and observation.

783. Then was it the result of the medical investigation made at that time that the cholera was distinctly to be attributed to the use of water from certain pumps?—It was very clear. There were some remarkable instances of persons coming from Hampstead, to take tea with friends who had water taken from that pump, taking the cholera, and going immediately back to Hampstead, and dying.

784. Then I need hardly ask you whether, under those circumstances, you concur with Dr. Letheby in thinking that it is essential to exclude sewage altogether from water of this character?—I think that there can be no two opinions upon the subject.

785. You are well acquainted, of course, with the district of the Lea generally?—I am.

786. Are you aware that the Metropolitan Board of Works have received from various vestries and district Boards, reports complaining of the quality of the water of the Lea which is at present supplied?—

> Mr. *Clerk* objected that if it was proposed to attack the purity of the East London Company's water, chemical evidence must be adduced in support of the allegation.
>
> *The Chairman* remarked that the reference was only to the general theory that water might be a vehicle for diffusing cholera.
>
> Mr. *Cripps* called attention to the fact that these reports have been already referred to, and that parts of them were on the notes.

787. Mr. *Wilkinson* (to the *Witness*).] Have you read the Report particularly of Mr. Knight, the chief surveyor to the vestry of Mile End Old Town?—I have.

788. Do you concur in the statements made by him, with reference to the state of the water at the different points indicated in that Report, and upon which my learned friend, Mr. Cripps, has already examined?—I think so.

789. *Chairman.*] Have you examined the river?—I have. Mr. Knight, in his Report, describes certain points at which the sewage flows into the river, and he describes them correctly.

790. Mr. *Wilkinson.*] Do you also agree with, and are you in a position to confirm the truth of a report made by Mr. Leman, the chairman of the Board of Works for the Poplar district: "That the source of the supply of the water of the East London Waterworks Company is the Lea and the Stort, and their tributaries; and having, as before stated, given the subject of reference their fullest consideration, and your Committee find, from personal inspection, that the water before it reaches the filtering beds, is pol-

luted in a most disgusting and abominable manner by drainage from land, overflow from cesspools, privies, factories, piggeries, &c., from the towns and places before enumerated, your Committee are unanimously of opinion that all practicable steps should be taken to enforce a supply of water free from any kind of pollution whatever." Do you confirm that report?—Yes; there is a very large amount of sewage going into the river.

791. A suggestion was made by Dr. Letheby, I think, that the passing of the sewage water through pipes to a considerable length would eventually purify it of all the sewage matter; you have, I think, under your consideration a very large project for taking the sewage of London to the Essex marshes, have you not?—I do not think that that was quite Dr. Letheby's statement; I think his statement is, that passing sewage through open channels, and mixing it with fresh water, would tend to purify it.

792. But so far as regards the passing through pipes is concerned, are you of opinion that any amount of passage would neutralise the deleterious matters?—I think that Dr. Letheby stated that sewage by itself, unless it is so diluted and exposed to the air, and so forth, would not become purified, or at least not for a long time.

793. Now, entertaining those sentiments yourself, have you not considered a plan by which the valley of the Lea might be thoroughly drained, and the sewage intercepted at proper points?—Yes; a plan by which the sewage can be intercepted from the river, without draining the valley of the water.

794. That is to say, without causing such a drainage as was anticipated?—The plan was for the removal of the sewage from the River Lea, leaving the water to pass into the Lea.

795. This is the plan upon which you reported to the committee of the Tottenham Local Board of Health, did you not?—Yes.

796. Then I will ask you to give me the leading features in detail, or, I may, perhaps, read shortly the parts of the report on which I rely. You received instructions from the clerk to the Tottenham Board of Health, and sundry meetings of committees were held, and local examinations took place, did they not?—Yes.

797. Upon that, on the 9th of March 1867, you presented to the committee representing the parishes of Tottenham, Hornsey, East Barnet, and the Colney Hatch Lunatic Asylum, a report?—I did.

798. Was the substance of that report this: "On the 14th of January last, I received instructions to make a preliminary report to you, as to the best means for the drainage and disposal of the sewage of the districts which you represent. With the valuable assistance of Mr. P. P. Marshall, the surveyor, of Tottenham, I have carefully examined the district and studied the subject, and have prepared a scheme for accomplishing the object you have in view, the outline of which I now beg to submit for your consideration. At an early stage of my inquiry, I became impressed with the impossibility of effectually and economically draining and disposing of the sewage of any of the following populous and detached towns or districts, situated on the north and east of London, except by embracing the whole under one comprehensive system, viz.: Hertford, Ware, Amwell, Hoddesdon, Broxbourne, Wormley, Cheshunt, Waltham, Enfield, Edmonton, Tottenham, Hornsey, East Barnet, Colney Hatch, Walthamstow, including Woodford, Leytonstone, Low Leyton, Wanstead, West Ham, East Ham, and Little Ilford. The River Lea forms the natural outfall for the drainage of all these places, and nothing short of an entire removal of their sewage, by a combined and comprehensive system of sewers, will purify its waters, and render the district a well-drained suburb of London. Ineffectual efforts have been made to dispose of the sewage of some of these places by deodorisation or otherwise; and Stratford forms a striking illustration of the bad policy of any separate town, so circumstanced, attempting to carry out its own independent system of sewerage. It has, I believe, already expended a sum of nearly 100,000*l.* in sewerage works, besides an outlay of 1,200*l.* a year to pump its sewage into the river Lea. It must yet expend a further very large sum to remove its sewage from the Lea, and it will always be involved in the annual cost of pumping. Probably one-half of this outlay expended in sewering Stratford upon such a combined system as is now proposed, would have effectually removed nearly the whole of its sewage to Barking by gravitation. Portions of the area upon which the before-mentioned towns are situated are still rural, whilst others are thickly inhabited; but the population is already so large, and is so rapidly increasing, that no portion of it is suited for irrigation with sewage. I recommend, therefore, that the above-named places be combined by an Act of Parliament, and formed into one drainage area, the limits of which are indicated generally by the coloured portion on the accompanying map. The sewage of the whole of this district can be conveyed by gravitation to Barking, where it would flow into the sewers now being formed by the Metropolitan Sewage and Essex Reclamation Company, to irrigate lands at many miles distant, or it could be discharged at and after high water into the Thames at Barking Creek, adjacent to the reservoir of the Metropolitan Board of Works, by enlarging the last mile and a-half of the Outfall Sewer to a width of 20 feet, which would communicate with the sewer of the Metropolis Sewage and Essex Reclamation Company, and with the Thames. From the reservoir, a main sewer, varying in size from seven feet to six feet in diameter, would be carried through East and West Ham, Leyton, and Walthamstow, to and under the river Lea at Tottenham, with a fall of 1′ 6″ per mile. The drainage of Tottenham would be conveyed by a branch about a mile long, under the Lea into the main sewer. Another branch, with falls of from 11 feet to 22 feet in a mile, would be extended along Lordship-lane to Hornsey, near the foot of Muswell-hill; and a third branch, with inclinations of from 13 feet to 20 feet per mile would be carried along the valley crossing Upper Edmonton, and between Southgate and Colney Hatch to East Barnet. The main line of sewer would be continued from Tottenham to Ware and Hertford, parallel with and near to the line of the Great Eastern Railway. This sewer with its branches would intercept from the river Lea the whole of the sewage now discharged into it from the adjacent towns, and would provide outfalls for the local drainage within a moderate distance of every portion of the district, and convert much of the rural districts into available sites for building. Several large streams flow through the district, and become important feeders to the River Lea. It is proposed, as far as possible, to exclude

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exclude the surface waters which flow into them from the sewage system, and to purify the streams by the diversion only of the sewage, and the more polluted surface waters into the sewers. For the reasons already stated, I have been unable to recommend you to carry out a system of sewerage for Tottenham, Hornsey, Barnet, and Colney Hatch only; and which would not afterwards become available for the drainage of Enfield, Edmonton, Waltham, and other places. It is only by collecting the sewerage of the whole district in one large stream that it becomes practicable so to reduce the fall in the outfall sewer as to avoid pumping; and further it would be a wasteful expenditure to have hereafter to form an auxiliary outfall sewer. A well-considered and comprehensive plan having been determined upon, it may not be necessary to execute the whole of it at once, and portions of the sewers passing through rural districts might be left open until the increase of building in the neighbourhood rendered it necessary to cover them; but as each section was constructed, it would form a part of a complete system, which would be permanently available. Considerable economy may be effected also by the use to a large extent of concrete in lieu of brickwork in the formation of portions of the main sewers. The length of the reservoir would be 1½ miles; of the main line to Ware, 24 miles; of the Barnet branch, 6 miles; of the Hornsey branch, 3½ miles; of the Tottenham branch, 1 mile; making a total of 36 miles. The present population of the district is about 200,000, and its present rateable value about 500,000 *l.*, but as it is being rapidly built over, its population and rateable value is correspondingly increasing every year. The outfall sewer would carry off nearly 7,000,000 cubic feet of sewage per diem, which would be sufficient for a population which may ultimately cover this district, with an ample water supply, and the removal of such of the rain waters as, falling upon the urban areas, would necessarily become polluted. The cost of completing the system of sewerage herein recommended may be estimated approximately at 500,000 *l.* To borrow this sum upon the security of present rates at 4½ per cent., the principal and interest to be paid off in 40 years, would require a rate of 10 *d.* in the pound. But if this more comprehensive system were carried out, it would be unnecessary for the East London Water Company to execute the sewerage works contemplated by them for the partial purification of the upper portion of the river Lea; and the plan now proposed would so effectually provide for the permanent purification of the waters of that river, that I have no doubt the East London Water Company, the River Lea Trustees, and the New River Company would, between them, willingly contribute probably about half of the estimated outlay, thus reducing the drainage rate to 5 *d.* in the pound; and I should further recommend that the work be carried out in sections commencing with those portions now most urgently needed, leaving open channels to connect the sewers through portions of the district at present rural, and covering them as the district becomes urban, and its rateable value increases. By this means the outlay might be considerably reduced below the maximum which I have named. The following are the heads of the recommendations which I beg to submit to your consideration. That application be made to Parliament during the next Session for powers to carry out the following objects, viz.: 1st. That the area coloured pink on the accompanying map, or such modifications thereof as may hereafter be thought desirable, be formed into a sewerage district. 2nd. That the proper parliamentary plans be deposited, and powers sought to carry out the scheme of drainage generally delineated on the accompanying plan, and described in this report, or such portions or modifications thereof as may from time to time be deemed necessary. 3rd. That powers be obtained to form a commission or board at which all portions of the district, the East London Waterworks Company, the River Lea Trustees, and the New River Water Company, shall be fairly represented, with power to borrow money upon the security of the rates or other property for a term, and at interest to be hereafter determined, and to receive proper contributions from the East London Waterworks Company, the River Lea Trustees, and the New River Water Company, for the execution of the said drainage works, and with power to levy a sewerage rate over the whole of the said district for the repayment thereof, such rate not to exceed a limit to be defined."

Mr. *Wilkinson.* That I believe was your report?—*Witness.* That is my report.

799. You have not seen anything since to alter your recommendations upon that subject?—No. I would just mention, that by that scheme each of those towns would have, in addition to their contributions towards this the main system of outfall, to carry out a complete system of drainage for themselves; and in point of fact, the only body who would derive any large pecuniary advantage from this scheme would be the East London Waterworks Company; all the other parties would be contributors to carrying out a better system of drainage, but they would derive no return from that, whereas the East London Waterworks Company would have the whole water, and would therefore get something beneficial to themselves for the outlay.

800. *Chairman.*] Why do you not recommend the New River Company to contribute?—I think that the New River Company should contribute, but nothing nearly so largely as the East London Waterworks Company, because this system will form an outlet for additional drainage which is likely to occur all round Hertford, above their source of supply, as the buildings extend in that direction.

801. But as you say the New River Company will derive no benefit from it, how can you expect them to contribute to it?—The New River Company would derive benefit by the diversion of some sewage at the present time. It would give them an outfall as the buildings increase in that neighbourhood, as there is very little doubt that they will, by means of which outfall they would get rid of the sewage in the New River.

802. Mr. *Headlam.*] What reasonable probability is there that such a scheme as that would be carried out?—I think that there is good reason to suppose that such a scheme will be carried out if the different persons interested can be got to work harmoniously to carry it out, for this reason: at the present time there is an injunction pending against the discharge of the drainage of Tottenham into the River Lea, and they will have to do something; and Barnet, I believe, is in the same position.

803. Who has moved for the injunction in that case?—I do not know, but the whole of that district is now becoming so rapidly built over that each portion of the district is applying for an injunction against the portion of the district immediately above it, and which drains through it. The Colney Hatch Lunatic Asylum drains through part of the district, and they are threatened with an injunction, if one is not yet applied for. I think the whole drainage of the district is coming to a point when something must shortly be done, and I think they are beginning to feel it.

804. Mr. *Wilkinson.*] Your attention has been called, I dare say, to the Report of the Commission which is sitting for preventing the pollution of rivers?—It has.

805. In the recommendations of that report you observe nothing that at all militates against the suggestion in your special report to the Tottenham Board of Health?—No.

806. On the contrary, do you agree with the suggestions of the Report of the Rivers Commission as being somewhat ancillary to the measures which you yourself suggest?—Yes.

807. And the Bill having now been reduced to an imperfect state, by omitting the obligation to which the Company itself consented, do you think that the passing of the Bill in that imperfect state would not render still more difficult the project which you yourself have recommended?—I think that it would go very far to prevent its being carried out.

808. Under those circumstances, do you think at any rate that, in the interests of that district, supposing the Bill to pass, some obligation should be imposed upon the Company of contributing to any future comprehensive scheme which might be carried out?—I do.

Cross-examined by Mr. *Hope Scott.*

809. Will you be good enough to point out in the Bill any one provision which will interfere with this large drainage scheme of yours?—Probably I can point out no clause which will interfere with it; but there is nothing that will promote it, and without something to promote it it will never be carried out.

810. Just let me understand; there is nothing in the Bill which will hinder it, is there?—No.

811. Then why do you oppose the passing of the Bill?—Because I think that it will be exceedingly injurious to the district to admit of the water being taken from the River Lea without any provision for purifying that water.

812. But do you not know that it must be taken from the River Lea at present, under the Acts of the East London Company?—Yes; but you propose to take more now, and that is bad.

813. Then the objection which you have is to their taking more?—My objection is to taking water at all from the River Lea as long as it is impure, and I think that the proposal to take more is still more objectionable.

814. You do not object to filling up the old reservoirs at Old Ford, do you?—No.

815. Do you object to a new filter bed?—No.

816. What you object to is anything which will store more water for consumption?—Yes.

817. And you think that that would be an interference with a general sewage measure; will you explain how?—I do not say that it would be an interference with a general sewage measure.

818. But I have my Bill to carry, and I want to know your objections to the Bill?—I think that the objections are that you want to take more water from the Lea, which I say is an impure source, without taking steps to purify it.

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819. But suppose that the Company needs more water and cannot get it anywhere else, what remains to be done?—I should say purify the water first.

820. Do you think they had better have no water than have the water of the River Lea at present?—I think that you should purify it before you take more, certainly.

821. Is your view this, that it would be better to have no water from the River Lea as it now is?—That may be a matter of necessity at the present moment.

822. Do you know how far it is necessary that this impounding should take place?—I know that it is very objectionable.

823. But do you know whether it is necessary or not?—I do not think that it is.

824. If it be necessary, then it ought to be granted, ought it not?—That depends entirely upon the degree of necessity.

825. It amounts to this; you are afraid of any Parliamentary affirmance of taking water from the Lea until that water is purified; is not that what you mean?—That is it.

826. It is nothing in the Bill that you object to, but you think that this would be quoted as a Parliamentary recognition of the Lea as a pure source, and that it would stand in the way, therefore, of your sewage scheme?—I am quite sure that if this Bill is once carried, the East London pany will be very indifferent about carrying out any works of purification.

827. Now I understand your position; I thought that it must be that; you do not lament their giving up their sewage scheme which they had in the Bill?—I think that the Bill is very much damaged by giving it up.

828. Indeed; but you said in your report which has just been read, that in view of this general scheme, "It would be unnecessary for the East London Water Company to execute the sewerage works contemplated by them for the partial purification of the upper portion of the River Lea." You have seen no reason to change your opinions, as you told my learned friend?—If the larger scheme were carried out.

829. But what I want to know is this: as matters now stand, you, looking to the general scheme, declare that it would be unnecessary for the East London Water Company to execute the sewerage works contemplated by them for the partial purification of the upper portion of the River Lea?—If the general scheme were carried out.

830. Nor do you desire them to carry out those works?—No; I desire them to carry out works of a more comprehensive kind.

831. Therefore you do not object to anything in the Bill, nor to the omission of anything from the Bill; all you object to is the company getting a recognition by Parliament of the use of the water of the Lea before it is purified?—As the matter stands at the present moment, my objection is to the omission of the sewers.

832. Why?—Because, to some extent, they purify the water of the Lea.

833. I thought that you said that it was unnecessary. In addressing the Tottenham Board you tell the Tottenham Board, your mind being wholly upon the general scheme, that it is unnecessary for the East London Water Company to execute the

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the works contemplated by their Bill; and you, also, tell the Metropolitan Board that the works do not appear to be such as would purify the water of the Lea, and that to be effective they should be of a much more comprehensive character?—Yes.

834. Do you recommend the omission from the Bill of those clauses?—Yes; as the matter stands at the present moment.

835. Have you changed your mind?—I have not. Indeed I think, as the matter stands now, it is most destructive to the interests of those who take the water; there is no attempt at purification now, and there was then.

836. But you are now upon your sewage scheme. Do you mean to inform this Committee that it would be compatible with your general scheme that this water company should have made those works which you declare in one passage to be unnecessary, and in another passage to be ineffective?—I neither declare them to be unnecessary nor ineffective. You take a portion of my statement and you do not take the whole. I think that my statement is very clear. I say that if the general scheme is carried out, then the partial works are unnecessary; I say that the works proposed by you would have done some good, but not the whole good; and I think that the abandonment of those works is most injurious to your Bill, without proposing anything else.

837. The purification of the Thames Bill became an Act in 1866, did it not?—I think it did.

838. And there is a Bill pending now for further purification?—Yes.

839. Do you remember in what year it was that Parliament sent all the Thames Companies up to Teddington Lock?—I do not remember.

840. It was in 1852. I will tell you that, then; some 14 years before any Bill was passed for the purification of the Thames, the Thames Companies were sent, *de novo*, to take their water from the Thames at Teddington Lock?—Yes.

841. Then the scheme for the purification of the Thames came forward; did the water companies resist it?—No.

842. Do you know that they have contributed to it, and that they have undertaken to pay 1,000*l.* a year each to the conservancy of the Thames towards that?—Not towards the scheme for the purification of the Thames. The Thames conservators had nothing to do with that.

843. You seem not to have read the Act, but the Committee have the Act before them. Why should the East London Company have a less interest in purifying the Lea after they get an additional supply, than the Thames companies in contributing to the purification of the Thames after, by Act of Parliament, they had been settled upon the Thames?—I cannot go into the reasons which have induced the other companies to contribute. There may be various reasons operating upon them.

844. Do you think that the East London Company is worse or more stupid than all the rest?—I am quite sure that if the East London Company get their Bill without any works of purification, they will be very much less likely to carry the matter out afterwards.

845. That is your idea?—That is my opinion.

846. Then the East London Company, having proposed certain sewage works, which you declare to be insufficient for the general purposes of the Lea, and having withdrawn it upon that ground, they are likely to be more opposed than the Thames companies to a contemplated purification of the Lea hereafter?—Yes.

Re-examined by Mr. *Cripps.*

847. After you fully detailed this scheme in your report, these words occur: "But if this more comprehensive system were carried out, it would be unnecessary for the East London Water Company to execute the sewerage works contemplated by them"?—That is my statement.

848. The whole of your statement about the East London Water Company's finding it unnecessary to execute those sewerage works depends upon your supposition that a more comprehensive system should be carried out?—Clearly.

849. Assuming that that more comprehensive system is not carried out, would you consider it a great objection to the Bill that they have taken out even the moderate amount of works which they had proposed by it?—It would seem to me to be a fatal objection.

850. Your objection to these works, as indeed appears clear from the former part of your report, is not in any way to the principle of an intercepting sewer?—No; it is that it did not sufficiently purify the water; and so I think it is very clearly stated.

851. You were asked about the other companies having contributed to the Thames supply. In 1852 there was no project for the purification of the Thames, was there?

> The *Chairman* intimated that all these matters were contained in the Act of Parliament.
>
> Mr. *Cripps* remarked that the question of remedying the pollution of the Thames had hardly arisen when the Thames companies were compelled to go to Teddington Lock.
>
> Mr. *Clerk* stated that there was a Thames Purification Bill in Parliament in the year 1852.

852. Mr. *Cripps* (to the *Witness*).] What I apprehend you to say is, that the East London Company is the party which has the main and principal interest in the purification of the Lea?—That is really my view.

853. And, therefore, if you take away that interest from those who now have to do it by giving this Bill, there would be nobody left to move in the matter.

854. And that you think very undesirable?—I think it is very important indeed that it should be carried out.

855. There is nothing in this recommendation of the River Lea Commissioners which is at all inconsistent with your scheme, is there?—There is not.

856. You think that it might be equally well carried out with that?—I think so.

857. *Chairman.*] Are you aware whether the Croydon system of disposing of the sewage continues to be successful?—Yes; I think it does.

858. Are you aware now what is generally understood to be the acreage required per head of the population to dispose of the sewage successfully on the land?—There is a difference of opinion upon that subject; but I imagine 100 people to the acre is somewhere about the number.

859. Are

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859. Are you aware of the number of acres within the area, coloured red upon your map, which are now under cultivation?—Yes.

860. Can you state the number?—I cannot state off-hand the number.

861. About how many acres are there?—I am afraid that I cannot give that; but I do not think that it is an area which is suitable for irrigation, because it is studded all over with buildings, and buildings are going on rapidly. I can take it out and give you the average of it at the next sitting of the Committee, if they think it well that I should do so. The population I have given; it is only to calculate the acreage.

862. Your system would not affect any of the tributaries of the Lea; it only applies to the Lea up to Hertford, does it?—No; it is capable of extension further; but my view was that having got to Hertford you get into a more rural district, and there probably the sewage would be susceptible of application to land in the form of irrigation.

863. Taking Hertford itself, do you remember what is the extent of the meadows below Hertford as compared with the population?—I cannot say.

864. Do you not think that upon your estimate they would be large enough for 10 times the sewage of Hertford, if anybody chose to apply it to the land?—No doubt they are fully sufficient.

865. Do you think that it is likely that the meadows below Hertford will be built upon at any early period?—Building is going on in that district very much.

866. In the meadows?—Not in the meadows.

867. Are there not thousands of acres of upland suitable for building, if anybody wished to build?—Yes; but I would not apply the sewage of towns to land near the towns to where it could be avoided. At Croydon it is carried some considerable distance from the town before it is applied to the land.

868. But at Hertford, is there not a very large acreage of meadow land quite disconnected with any buildings or houses?—Yes; but it must be borne in mind that the great expense of this intercepting sewer is at the lower end. It is almost entirely from Tottenham to Barking; after that the sewers become very much smaller, and are much less costly.

869. You have not included Bishops Stortford, nor the towns on the Stort, in your report, have you?—Not below Hertford and Ware.

870. Do you consider that the agriculture below Bishops Stortford is quite sufficient for the application of sewage of Bishops Stortford?—I have not gone into that subject, but I think that so far from London it would be admissible.

871. Looking to the extent of agricultural land, and the success which has attended the application of sewage at Croydon, do you see any necessity for beginning any system for carrying off the sewage to the River Thames, beginning so high up as you have proposed?—Yes, I would do so for the reason which I have stated; that in the upper portion of that work the sewers are very small and very cheaply constructed; and for that reason I think it is desirable.

872. But why should the sewage be carried to Essex to be applied to the land there on the sea coast, when it seems to be just as easy to apply it to land in the immediate neighbourhood of the towns?—I do not think it desirable to apply it to land in the immediate neighbourhood of towns.

873. But what necessity is there to carry all the sewage from Hertford to London, and from London to the sea shore, when there are thousands of acres to which it can be applied at a moderate distance from all those towns?—For instance, near Hertford there may be meadows which you could irrigate, but the whole of that valley is thickly peopled, certainly up to Walthamstow, and round by Barnet, Enfield, and all that neighbourhood; and there is no place where you could irrigate.

874. At what level are there no places which you could irrigate?—There are no places where you could irrigate satisfactorily, on account of the population.

875. But have you examined the population with reference to the acreage, so as to be able to state that?—I have been all over the ground to see whether there were suitable places for irrigation.

876. Do you mean speaking of the whole of the country?—Taking the whole of the country as far as Enfield and Walthamstow as a boundary, and all within that line; and having regard to the present population and the building which is going on now, I do not think that it would be safe or proper to irrigate lands within that area.

877. Having regard to the irrigation going on at Croydon, and the population there, and the extent of land there, would it not be accurate to say that there are 10 times the facilities in the valley of the Lea that there are at Croydon?—I think not.

878. Perhaps you will give the Committee a statement of the area and population in the district?—Yes; it must be borne in mind that, with regard to the area, you cannot take the whole of that area as available for irrigation, unless you go to the expense of pumping the sewage upon it.

879. I asked you with reference to the different levels, and you answered generally, without reference to the levels?—If you take the boundary which I have given, there is a general fall towards London, and the natural inclination and flow of the sewage would be towards London; and I say that within that area there is no locality which is suitable for the application of sewage by irrigation. That is a subject which has been considered a great deal by other engineers before I considered it; and I think that there has been a general agreement upon the subject, because they have been pressed very much to get rid of their sewage, and there has been great difficulty in doing it.

880. But has there not been a great change of opinion recently, with reference to the acreage per head which is required for the purpose of disposing of the sewage?—I think not.

881. Was it not supposed, a few years ago, that a much larger acreage was required, and were not the works originally laid out upon that assumption, and has it not proved to be erroneous?—There are those who contend that a much larger acreage than I have stated is necessary; but I take Croydon as a standard, and I think that 100 people to an acre is a fair and proper number.

882. Then as there are 153,000 people in that district of the river between Hertford and Ponders End, that would require 1,530 acres to dispose of all the sewage, would it not?—I think that I gave a population of 20,000 in the area which is coloured on that map.

883. But as regards the area drained in that district, it appears that there are 153,000 people in the district between Hertford and Ponders End;

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End; that, therefore, would require 1,530 acres to dispose of all the sewage?—Yes.

884. Do you know how many thousand acres there are now under agriculture in that district?—I do not know at all; a large quantity, no doubt.

885. Many thousands of acres?—I should think so.

886. Mr. *Benyon.*] Are you aware that there are deodorizing works for the sewage of Hertford?—Yes; at Hertford, Tottenham, and Colney Hatch.

887. And Hertford is the only material town which is above the source from which the New River Company takes its supply of water from the Lea, is it not?—Yes.

888. Then, what ground do you think that the New River Company ought to contribute to the expense of the drainage system?—Because I look upon that district as one which will, in the course of a few years, be very much built over; and such a system of sewers will afford an outfall for the drainage of the whole of that area.

889. But the New River Company has nothing whatever to do with that district, except up above Hertford, because it takes its supply from Hertford, does it not?—Yes; but I take it that there will be building just above Hertford, the source of their supply; and they have gone to a very large expense in getting rid of the sewage of Hertford.

890. *Chairman.*] Apart from the objection which you have raised, do you consider that the works proposed would improve the water supply of the East London Company?—It would increase their supply.

891. Do you consider that it would improve it as well as increase it, or not?—I take it that getting rid of the old reservoir would be an improvement; but I have not looked into that question myself.

892. Have you considered whether the storage of 300,000,000 gallons of water would tend to improve the supply of water by the Company, or not?—I am not prepared to say that; I think that is very questionable, but I have not gone into that subject.

893. It would improve the quantity at all events, would it not?—It would increase the quantity, but I do not think that it would improve the quality.

894. Mr *Clerk* (through the *Committee*).] Would it not enable the Company to shut out the first waters of a flood, and to take in only the subsequent waters of the flood?—Of course they could do that; but if they are short of water they will take in all they can get, I suppose.

895. *Chairman.*] But supposing that the flood waters were more than enough, would it enable them to regulate the admission of flood water, so as not to take in the first?—They would be in the same position as they are in now, except that they could take more.

896. Would that be a means of equalizing the supply, so as to enable them to select the best flood water and to reject the grosser flood water; and in that respect would it improve the quality of the water?—I do not see that it would.

897. Colonel *Hogg.*] Do you think that your scheme would purify the water?—Clearly; it is the only thing that will do so, I think.

898. *Chairman.*] Have you considered in what per-centage the River Lea would be reduced if your scheme were carried out?—I think not at all.

899. The same volume of water would flow down the river you think?—Yes.

900. In dry and wet weather?—Yes; if the works were properly constructed. It would require a good deal of care in forming the sewers to have no leakage into them; but, as everyone knows, that is a mere question of expense.

[The Witness withdrew.

Mr. *Wilkinson* stated that that was the case for the Metropolitan Board of Works against the Bill.

Mr. *Pember* stated that he did not propose to call witnesses on the preamble of the Bill, in support of the opposition of the River Lea Trustees.

Mr. *Johnson* stated that arrangements had been made by which the opposition of Mr. Hunt would be withdrawn.

After some conversation as to the course of procedure,—

[Adjourned to Tuesday next, at Twelve o'clock.

Tuesday, 28*th May* 1867.

MEMBERS PRESENT:

Mr. Ayrton	Lord John Hay.
Mr. Henry Baillie.	Mr. Headlam.
Mr. Benyon.	Colonel Hogg,
Lord Frederick Cavendish.	Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

EAST LONDON WATERWORKS (VARIOUS POWERS) BILL.

Captain Tyler's Report having been handed in to the Committee,

The *Chairman* inquired whether Mr. Cripps was prepared to proceed to address the Committee on the Report.

Mr. *Cripps* replied that he had not yet an opportunity of reading the Report, and that, therefore, he was not prepared to address the Committee upon it.

The *Chairman* stated, that the Report having been handed in, it would be unnecessary to examine Captain Tyler *vivâ voce*, and that the Report would be taken as the expression of his views and opinions upon the matter.

EAST LONDON WATER (THAMES SUPPLY) BILL.

Mr. *Wyatt* applied for an adjournment of the hearing of this case, on the ground that certain difficulties had arisen in the arrangements between his clients, the Conservators of the River Thames, and the Promoters of the Bill, and that he had not had sufficient time to instruct counsel to appear against the Bill.

Mr. *Hope Scott* was heard against the application for adjournment.

After some discussion,

The *Chairman* stated, that the Committee considered that there was no occasion to postpone the Preamble of the Bill, but that when the question arose as to the conditions of the arrangement between the Conservators and the East London Waterworks Company, the Conservators would have an opportunity of being heard upon the clauses.

Mr. *Wyatt* stated that, with great respect to the Committee, he should withdraw.

Mr. *Hope Scott* was heard to open the case for the Bill.

Mr. Charles Greaves, sworn; Examined by Mr. *Clerk*.

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901. You have had, I believe, for some time past, under your consideration the further supply of water to your district?—Yes, I have, for many years.

902. My learned friend, Mr. Hope Scott, has given the Committee the numbers and figures, and, in order to get them upon the notes, I must ask you a few of them, if you please.

The *Chairman* inquired, whether these figures could not be put in in a tabular form.

Mr. *Hope Scott* handed in a paper to the Committee.

903. *Chairman* (to the *Witness*).] Have you read this paper?—Yes.

904. Is it accurate, so far as you know?—It is accurate, as far as I know.

905. Mr. *Clerk*.] I believe that you have ascertained that the daily average, during the dry months of the year is very much greater than during the other months of the year?—It is.

906. You must be prepared at those times to meet the greatest possible demands upon your resources?—Yes, everything has to be done to meet the maxima and the minima; averages, though they are very useful, are not certain guides in these matters.

907. I suppose that we may take it that the daily average during the drier months of the year is about 10 per cent. above the daily average?—The average of the three drier months exceeds the average of the rest of the year by about 10 per cent.

908. Even supposing that you had the full

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power of the reservoir contemplated in the other Bill, you still will be short, to the extent shown by these figures, in a few years' time of the demand, will you not, if the district goes on increasing as it has done to the present time?—Yes; it is assumed that the district will continue to increase as it has lately increased, and, therefore, the deficiency will be as it appears in this tabular statement.

909. I believe that it is in your district that there has been the greatest increase, and there is the greatest probability of increase?—I cannot exactly answer as to the increase there being the greatest, because I have not studied precisely the comparative increase of all the different populations; but the increase on the average of the metropolis is stated in the replies given to the Committee by the various companies.

910. Was it 1·73 per cent.?—The increase in the East London district considerably exceeds that.

911. I believe that you have considered very fully all the sources from which you could get water in aid of the River Lea?—I have done so. For nearly the last ten years I have had my attention continually directed to it.

912. You tried chalk wells, and you got less than half-a-million gallons from one chalk well, did you not?—Yes.

913. And you consulted, I believe, Mr. Morris, the engineer of the Kent Waterworks Company, which takes its supply entirely from the chalk?—Yes, I consulted Mr. Morris, who I thought would have been as much in favour of wells as any engineer living, and a man of thorough experience in the matter; and although he gave his opinion that wells would supply us with water, his opinion was not so strong or so decided as to make it a desirable expenditure to encounter with such a problematical result.

914. And I believe that Mr. Bateman gave you the same advice, that you could not calculate upon chalk wells giving you a large supply of water?—He did.

915. You told us the other day that you had considered the taking of water from the Ouse?—Yes.

916. It would be a very costly thing to get water from the Ouse, would it not?—It would be a very expensive piece of engineering.

917. What distance is the nearest point of the Ouse from your works?—Forty-eight miles from any point to which we could distribute in London.

918. And I believe that you found that the quantity which you could expect to get there would not be sufficient?—I examined the Ouse during the same drought as we suffered from in these parts, and I was rather struck with the smallness of the river.

919. Now the other matter which was considered both by yourself and Mr. Bateman, was the question of storage in the Lea?—

920. Mr. *Henry Baillie.*] As regards the River Ouse, what was the objection to the water there?—The chemist whom we consulted did not give us a first-rate qualification of the water, and the distance and the expense altogether went against it. There was some uncertainty as to the volume, and it was in rather an inferior position in point of quality, if we assumed a good position in point of quantity. I found that we were obliged to go below Bedford to get to a point where we might be sure of the quantity being safe.

921. *Chairman.*] Then you would have to bring it over the watershed between that valley and the valley of the Thames?—Over the Chiltern Hills, which lie between the northern part of Hertfordshire and the valley of the Ouse.

922. Mr. *Henry Baillie.*] What is the distance?—Forty-eight miles, from above St. Neot's to the point where we could distribute in London.

923. Colonel *Hogg.*] What is the distance from the Thames?—About 21 miles.

924. Mr. *Henry Baillie.*] But you could have bored through those hills, could you not?—I proposed a tunnel of several miles, which would have reduced the lift, I think, 70 feet: but then I was still obliged to lift it 350 feet, notwithstanding the tunnel. The chalk hills are excessively high.

925. Mr. *Clerk.*] I believe that Mr. Bateman concurred with you in abandoning that idea?—Yes.

926. You considered also, I believe, the question of getting a larger amount of storage on the River Lea itself?—I have.

927. Certain figures were read by my learned friend, Mr. Hope Scott, with regard to some scheme of Mr. Rendell's; do you know at all what the cost of that is?—

> The *Chairman* stated that the cost was given in the report, in answer to Question 5493, as being 530,000 *l.*

928. Mr. *Clerk* (to the *Witness*).] Have you tested that at all?—I was in attendance on the Committee of 1852, for the company, at the time when those plans were brought forward, and the estimates were investigated, but I cannot charge my memory with the exact conclusions which we came to upon them. I think, so far as I can recollect, our idea was, that they were estimated excessively low.

929. But supposing that any storage of that kind was created upon the Lea, would it necessarily have the effect of diminishing the ordinary flow of the river to meet the average demand?—The object of the reservoirs, such as were proposed by Mr. Rendell, was to impound all the flood water, all the water which could be laid hold of. The reservoirs were proposed to be constructed in the valleys, on the rivers as they flowed, and not on one side of them, so as to block the river in bodily. Therefore, of course, so long as the water was being impounded into the reservoirs, the river would have been stopped altogether below.

930. But looking to the flow of the water in the Lea, if you were to store a sufficient quantity to give you a certain supply, might it have the effect of diminishing the average flow of the river?—In the lower part the flow of the river would cease. There would be no river except from the local springs, or from the local rainfall.

931. Concurrently with you, the New River Company have the power of making reservoirs, have they not?—Yes, they have the power of taking the water for storage; that is the expression in the Act.

932. So that this storage power might be divided between you and the New River Company?—Yes, that is the construction of the Act of 1855.

933. And I believe that you consulted Mr. Bateman upon that matter?—I did.

934. And

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934. And I believe that he entirely concurred with you in the propriety of going to the River Thames to seek an additional supply?—He concurred in the propriety of extending already commenced systems of reservoirs to the limits that the ground immediately surrounding them would admit of their being extended to, and then supplementing the supply of the Lea by a draught from the Thames.

935. And I think that his advice was that you should go for, at least, 10,000,000 gallons?—For, at least, 10,000,000 gallons.

936. And your Bill, which is now before the Committee, is for the purpose of enabling you to take a quantity not exceeding that from the Thames?—It is.

937. Of course, with such a distance as you will have to construct your mains to get to the Thames, unless you were empowered to take such a quantity as 10,000,000 gallons, it would be hardly worth your while to construct such a line of mains?—Quite so. The expense is considerable, exceeding a quarter of a million; and the expense, as it were, diminishes as the quantity increases.

938. The calculations with regard to that, and as to the supply which the Thames will yield, are shown on this printed paper which the Committee have before them. Now I think I may ask you to describe what the works are under the present Bill; you have selected Sunbury, I think, as the place from which you propose to take water?—Yes.

939. No objection, I believe, has been raised to that point of abstraction on the part of the conservators?—None. There is no topographical objection on the part of anyone.

940. I believe that you have selected that point because the roads leading to Sunbury are not occupied with the mains of other companies as the other roads are?—Yes; the roads at Hampton and Isleworth, and Twickenham are full of pipes. There is one place where there is no room to get another pipe in; but the road from Sunbury, through Hounslow, is a fine open road, and presents no difficulty or obstruction.

941. Will you be good enough to describe what it is you propose to do in proceeding from Sunbury towards your district of supply?—The proposition is to erect a certain amount of engine power and engine-houses not far from the bank of the river at the upper end of the town of Sunbury, rather beyond all the population and the houses, to lift the water from there to a site chosen about two miles on the way to London; at that point it is proposed to filter the water and to carry out all those arrangements preparatory to sending it forward to London, which would be necessary in what may be called a complete waterworks.

942. Would the water, which is filtered in the neighbourhood of Sunbury, be taken in that filtered state to Walthamstow?—I should say that it would be; that is my intention.

943. Then that water, which would be so taken to Walthamstow, would undergo a second process of filtration?—It would go into the reservoir, so far as the water went to Walthamstow, and mingled with the other supply, and would receive a second filtration as it passed into the second system of distribution.

944. *Chairman.*] That is, so much of the water as was not taken directly from the proposed reservoir at Hornsey Wood Hill?—Exactly.

945. Mr. *Clerk.*] In addition to that mode of supplying water you propose also, I believe, to raise the filtered water from the neighbourhood of Sunbury to a reservoir from which you can deliver it by gravitation?—Yes, I propose to construct a reservoir of moderate dimensions on the most convenient and accessible unoccupied high ground which there is on the road to use; that is, a service reservoir connected with the existing district, and so the water would be already filtered, covered, and in the condition required by the general Act, to distribute it into the company's district from there.

946. *Chairman.*] Then we understand that the pumping at Sunbury will pump the water up to the height of the reservoir in Hornsey Wood Hall?—It will.

947. Mr. *Clerk.*] It must go to that height, must it not, to get over the summit level at Walthamstow?—Yes, the actual summit on the section is a trifle higher than at the reservoir. It is at the Brecknock Arms in the Camden-road. The level of the water in the reservoir is about 14 feet lower than the summit.

948. Are there certain fields there where it has been proposed to construct hereafter a park?—There are.

949. Powers were obtained, I believe, by the Metropolitan Board of Works a good many years ago, in 1857, for the purpose of making a park for Finsbury?—Yes.

950. That land is still in the condition of open fields, I believe?—It is still in the condition of open fields.

951. What quantity of land should you require under your scheme to occupy there in any part of the park for the purpose of your reservoir?—About three acres of land would be required for the purposes of the works after the operations of construction were completed. The reservoir itself would a little exceed two acres.

952. But, for the purpose of construction, you would require about one acre more?—For the purposes of construction, to be able to fence it round, and to appropriate, as it were, a certain quantity of ground, including a strip over the pipes going in and out; but it is not necessary that that should be absolutely separated from the domain of the park. It might be merely marked out by posts, or anything that was necessary.

953. I believe you sent a plan on the 9th of February to the Metropolitan Board of Works, showing them how you proposed to deal with that part of those fields?—Yes, a plan was proposed early in the year to indicate to the Metropolitan Board the way in which the ground would be occupied.

954. If that were carried out, would your reservoir be entirely below the surface of the ground?—The water would be entirely below the surface of the ground. As the section shows, there is a small portion elevated which would form, as it were, a terrace in the ground, but which, if it were necessary to hide it, might be so obliterated by raising the bank below, that nobody would know it was there.

955. And you might make this ground of so ornamental a character that nobody would know that there was a reservoir underneath?—It might be levelled, but the fashion of the present day is rather to undulate the ground in the parks, and give it a varied character.

956. There would be a good deal of material, of course, excavated from the ground in the construction

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struction of the reservoir?—There would be a considerable quantity which need not be removed off the estate, if those who had the management of laying out the park preferred to retain it there.

957. And that might be made into little hills and dales, and so on?—I should think it might, but I do not profess to be a landscape gardener.

> The *Chairman* inquired whether clauses had been proposed by the promoters of the Bill to the Metropolitan Board of Works.
>
> Mr. *Clerk* replied, that the promoters had been waiting for an answer from the Metropolitan Board of Works, and had not yet received one.

958. Mr. *Clerk* (to the *Witness*).] You are ready to meet the views of the Metropolitan Board of Works as far as you can?—Quite so, so long as they do not interfere with the purposes for which the reservoir is to be made.

959. There will be, of course, a line of mains entering this reservoir, and another one carried along the Seven Sisters'-road, down to your point of distribution?—Quite so; there must be an inlet and an outlet, and these mains would be buried in the ground, and hidden from sight.

960. I believe your pumping station at Sunbury will be of an ornamental character?—It is proposed to erect it so.

961. And you are to consume your own smoke?—To make no smoke.

962. The mains, I believe, will be carried along the high roads in the ordinary way?—They will be carried in the ordinary way, and to the satisfaction of those who have the jurisdiction over the roads.

963. And so those mains which will be carried away from this reservoir will be, of course, below the surface of the ground, carried along the roads in the usual way?—In the usual way, carried below the surface throughout.

964. The water from this Hornsey Reservoir will be at such a height, will it not, that it will be able to be delivered by gravitation?—The water in that reservoir will command a higher level than any water which I am pumping at present for general distribution; the gravitation power will be sufficient to command the whole district.

965. Of course you can point out the line of pipes, but there is no question raised by anybody as to that?—No; the road is a broad one all the way, and convenient.

966. And you are prepared, of course, to insert clauses for the ordinary protection of sewers, and so forth?—Yes.

967. They are already in the Bill?—Yes.

968. Then I must ask you as to the estimate; will you tell me what the cost of the different works will be; there will be the river-side station at Sunbury, and the engines there. Now, there is a pumping station at Sunbury to be built at a cost of 12,000 *l.*, is there not?—£. 12,000 is the total amount of the estimate for the station on the river side at Sunbury.

969. Then there is the station land, filtering beds, and sluices in the neighbourhood of Sunbury?—That amounts to 31,000 *l.*

970. Then there will be the engine-houses for pumping the water from the filtering beds, either to the Hornsey Reservoir, or to Walthamstow?—Yes, engines and engine-houses I have put down at 33,000 *l.*

971. Main pipes?—Main pipes, 147,000 *l.*

972. What will be the cost of the Hornsey Wood Reservoir itself?—The cost of the Hornsey Wood Reservoir itself will be 24,000 *l.*

973. Making a total of how much?—£. 247,000, which, at five per cent., amounts to within a few pounds of the amount put down as to be raised for the purpose, namely, 260,000 *l.*

974. And it was stated by my learned friend, Mr. Hope Scott, that your capital at the present time was 1,400,000 *l.*, and that you had no mortgage debt at all?—That is so.

975. *Chairman.*] Why are your reservoirs separate from the first pumping station, so as to make two pumping stations necessary?—I did not see a convenient place for the erection of filter beds close to the bank of the Thames, and it appeared that land would be more expensive there; and, altogether, I thought it advisable to sever the main pumping station and filter beds from the works immediately on the border of the Thames.

976. Mr. *Clerk.*] Does the Thames flood heavily at Sunbury?—The Thames floods heavily on the meadows at Sunbury, and I thought it better to remove the filter beds a short distance. At two miles from the river side there is a railway station and access, and the soil appears to contain that which is wanted for the construction.

977. *Chairman.*] Gravel and sand?—Gravel and sand near the Sunbury Station, a little on the northern side of the Sunbury Station.

> Mr. *Cripps* stated that he proposed, in cross-examination, to confine his questions entirely to the point as to the Finsbury Park.

Cross-examined by Mr. *Cripps.*

978. With reference to this reservoir, have you any information at all of the plans which the Board of Works have adopted for the laying out of Finsbury Park?—None whatever.

979. Did you apply for any before you elected to put the reservoir in this place?—When I pitched upon the place for a reservoir, I had not the most remote idea that the Metropolitan Board had bought it, or that Finsbury Park was to be there; I found some deserted fields in a most extraordinary state, and I went on with the notices.

980. I take it for granted that if you had known that it was to be a park you would have made a different selection?—If I had had the least idea of the outline of the park.

981. How many acres do you say you require during the construction of the reservoirs?—About three acres.

982. You do not mean that while the works are about you would not require to use a larger quantity?—The contractor's works might exceed that a little bit, but I do not know why they should; I do not take into account the road by which the carts would be drawn in and out.

983. What have you estimated to be done with the excavation?—I have estimated for the ground to be removed.

984. Yes, but how far; that makes the difference of expense probably; where do you take this large excavation to?—The nearest tip.

985. But do you mean without any reference at all to what is going to be done with that ground?—Yes.

986. That

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986. That is the way you have proceeded, is it?—Yes, of course; I should be very happy to sell it to the Metropolitan Board, if they want it.

987. There would be no difficulty then in removing it, if it is desired that it should be removed and the space left clear?—There would be a certain amount of difficulty; that is to say, it would cost less money to leave it there than to take it away.

988. But the difficulty would be one of expense?—The difficulty would be one of expense; there are frequently places requiring ground in the way of filling, and sometimes it is a surplus altogether; every bit of it could be made into bricks if any ground could be found to make them on.

989. But you do not propose to make bricks in the park, I suppose?—No; I do not propose to take brickmaking powers.

990. Your reservoir within the limits you have taken would be within that pencil mark on this plan, would it not (*showing a plan to the Witness*)?—That is somewhere about it.

991. Then there would be no objection, I suppose, to so constructing your reservoir as to have no interference with these proposed villas here (*pointing to the plan*), limiting yourselves not to use the land at this point (*pointing to the plan*)?—Yes; if these lines are correctly laid down.

992. Otherwise it would be impossible to put houses there (*pointing to the plan*)?—Yes.

> Mr. *Clerk* objected that this plan ought to have been produced before.

> The *Chairman* remarked that it was a mere question of compensation if the reservoir were constructed where the villas were to be placed.

> Mr. *Cripps* stated that he was merely asking these questions with a view of calling Mr. Bazalgette to refute Mr. Greaves.

993. Mr. *Cripps* (to the *Witness*).] Then you say that there will be no difficulty in avoiding that part?—None whatever; indeed, if I had known that those villas were going to be where they are, I might have altered the sites of the reservoir a trifle.

994. Your pipes from the reservoir would be at present as drawn here (*pointing to the plan*)?—Yes; we can put the pipes wherever you like.

995. There would be no objection or difficulty, would there, if you please to do it, in putting the pipes along this road (*pointing out the same*), so as to avoid going under the houses?—Nothing whatever; there is nothing to limit the position of the pipes at all in any reasonable sense.

996. Is your proposition in the Bill to take the land absolutely, or to take an easement?—We are quite willing to take an easement.

997. As you say there is no difficulty in leaving the land level and ornamental?—With the exception of a small amount of excrescence, which appears on the lower side in the cross section, those are the amenities of the plan.

998. There would be no difficulty in making that level, would there, if it were desired?—As level as that (*pointing to the plan*), or this might be made an even inclination (*pointing out the same*).

999. Now your Bill takes the power of an extension over five years to construct your works?—Yes.

1000. There would be no difficulty, would there, in limiting this particular part where the park is, to a very much shorter period?—No, I would take two years; but you might give me three, perhaps.

1001. Of course, it would be extremely undesirable to have any works going on there while the park is being opened?—But you will not have built all those houses in two years. I should prefer three years; but we could do it in two if it were any accommodation to the public in allowing the park to be opened sooner.

1002. That is from the time when you get your powers?—From the passing of the Act.

Re-examined by Mr. *Clerk*.

1003. There is no symptom on the ground of anything of that kind, at present, I believe?—There is no such road as that at present; the roads have a different form.

1004. *Chairman*.] We understand that you proposed these works without knowing that the land had been appropriated by Parliament for a public park?—Personally, I was quite ignorant of the matter.

1005. If you had known it, you might have taken land at the side which is more vacant?—I do not know that any land there is more vacant.

1006. Is there not a great quantity of vacant land in the immediate neighbourhood of the park?—No.

1007. Are you quite sure of that?—Quite true; I have been over every yard of it. Everything that is accessible is being built upon very rapidly, and there is no other site with proper elevations to be had.

> Mr. *Wyatt* expressed a hope that, although he did not cross-examine the Witnesses to-day, the Committee would allow him to do so to-morrow, if on communication with his clients he found it to be desirable.

> The *Chairman* stated that, if any question arose on the clauses tendered by the Conservators, Mr. Wyatt might examine Witnesses.

> Mr. *Wyatt* desired the Committee not to consider that his clients withdrew from opposition to the preamble of the Bill.

> The *Committee* intimated that the application must be made when the time came.

1008. Mr. *Clerk* (to the *Witness*).] How long would it take you to complete those works when you have once begun?—I should like to have two years to do it in. Deep excavations in clay require a certain amount of care.

1009. Of course, it would depend to a great extent upon the seasons?—It would depend to a great extent upon the seasons.

1010. And one work must depend to a great extent upon another?—Certainly.

1011. Then, at all events, if you are to be limited for a certain time from the passing of the Act, you would require three years?——

> Mr. *Cripps* submitted that the Witness had not said this.

> *Witness*.] You must take the answer as I gave it.

1012. You have to make your arrangements or bargains with the Metropolitan Board of Works. If they hold you at arm's length as they have

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have done for the last nine months, it may be 18 months before you come to any arrangement with them?——

Mr. *Cripps* objected that this was rather a matter for observation than for evidence.

1013. Mr. *Clerk* (to the *Witness*).] You would require to have two years to do the works?—I should like to have two years.

1014. Would it then be safe for you to undertake to complete those works within a shorter time than three years from the passing of the Act?—I might agree to have them all finished by Christmas 1869.

1015. That is presuming you get possession of the land?—Yes.

1016. Mr. *Kekewick.*] Is that the highest point of your line of communications at Hornsey Wood Hill?—No; the highest point is the "Brecknock Arms," where the Seven Sisters-road crosses, what used to be called Maiden-lane, which is now called the York-road. That is the actual summit, but that is all built over, and is further away from our district, and is not so convenient.

1017. Then there is no open space for a reservoir?—There is no open space for a reservoir, and it is a most fortunate thing that there is that ground.

1018. Placing your reservoirs there would greatly facilitate your other reservoirs and your means of supplying London?—It would.

1019. Colonel *Hogg.*] It must be quite recently that that ground has been built over?—It is within the last 10 years. Occupation of it has been going on since the construction of the Cattle Market and the Holloway Prison, and other large erections. It is getting very rapidly covered with houses.

1020. Mr. *Kekewich.*] Is the park actually laid out?—I did stumble over two or three wooden pegs in the ground the other day.

1021. Is it planted?—Nothing of the kind.

1022. Is it laid down with grass?—Quite the contrary, the hedges are a good deal dilapidated, and people ramble all over it on Sundays and holidays, without any obstruction. The place is well-known as a place for pigeon shooting matches, The Hornsey Wood House and the pond.

1023. Mr. *Headlam.*] Am I right in supposing that nothing has been done in respect to the park?—There has not been a sod turned. I believe they have put locks to one or two of the gates, but nothing has been done.

1024. Mr. *Clerk.*] I believe it is all open fields?—Perfectly open.

Mr. *Clerk* stated that he had intended to call Mr. Bateman, but that that gentleman was in Ireland; and that, therefore, he would now close the case for the Bill.

The *Chairman* intimated to Mr. Cripps that he had better examine Mr. Bazalgette now.

Mr. *Cripps* stated that the Metropolitan Board of Works did not desire to prevent this work being carried out, but only to have it carried out in a particular way.

Mr. JOSEPH WILLIAM BAZALGETTE, sworn; Examined by Mr. *Cripps*.

Mr. *J. W. Bazalgette.*

1025. ARE you Engineer to the Board of Works?—Yes.

1026. And I believe that, in connection with them, you had under consideration the laying out of the land for Finsbury Park?—Yes.

1027. Has the site for that been purchased?—It has.

1028. By the Board of Works?—Yes.

1029. And having been purchased, has this plan been prepared as the plan which you think will be most expedient for the purpose of carrying it out?—Yes; it has been laid before the Metropolitan Board of Works.

1030. How long ago is it since the purchases have been completed?—I do not know.

1031. However they are completed?—They are completed.

1032. About how long ago is it since this plan was laid out?—This plan has been laid out for many months.

1033. And this is the plan to which, as advised at present, you intend to adhere?—Yes; that plan has been under consideration from time to time at the Board, and was finally approved of in that shape.

1034. And as it indicated here, of course these (*pointing to the plan*) are to be villas with ground attached, and the park itself is to end at that road?—Yes; I should state that further than that these roads have been staked out on the ground. Contracts have been entered into for the formation of the roads and the sewers, and for the drainage of the park, which would be completed within 10 months from the present time. To the best of my recollection the sewers would be completed within six months, and the formation of the roads within four months afterwards. The order has been given for the commencement of the works, and, therefore, in about 10 months from the present time they will be all completed.

1035. You have seen this plan, and the limits of deviation where this reservoir is proposed to be constructed?—Yes.

1036. Is it necessary for your convenience that they should be constructed at this side of that road (*pointing to the plan*)?—Yes; I think I can explain that perhaps better by explaining the map to the Committee (*describing the same*). The position of the reservoir, as at present proposed, is shown by the pencil line. The limits of deviation pass along, including those houses, up to that point (*pointing out the same*). If the reservoir were to come under that road or underneath those houses, it would prevent the formation of those houses, and it would entirely interfere with the present design.

1037. *Chairman.*] Then you think it necessary to keep the reservoir exactly as it is laid down upon the plan, and not to allow any deviation?—No; I think that the reservoir in its present position would be very objectionable. It would stand up as a hump in the middle of the park, and interfere very much with the ornamental character of the park. If the reservoir is formed in that position, I think the most convenient way would be to form it just by the side of that road, and by this means the pipes might be carried from it along the road without cutting up the park, App No. 11.

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park, and get into the main road without going through the houses and gardens, as shown upon this plan *(pointing to the plan)*. But my idea is, that it should be done under the direction of the Metropolitan Board of Works, so that there might be time to consider what was the most convenient way of doing it.

1038. Mr. *Cripps.*] With regard to the amount of earth which would be excavated from there, what should be done with it?—I think that the company should be bound entirely to remove that ground, unless with the sanction of the Board of Works.

1039. *Chairman.*] Then you see no objection to the reservoir being constructed, provided the works for the reservoir are under the control of the Metropolitan Board?—I think that it would be very much better if the reservoir had been placed on the other side, out of the park altogether; but I think that, under proper restrictions, it might be made very conveniently for the public.

1040. Mr. *Headlam.*] How is the ground opposite?—

1041. Mr. *Benyon.*] What is the elevation there, because that is rather important?—I think there can be no very great difference of elevation. They could make up with embankments in so short a distance.

1042. Mr. *Headlam.*] What is the nature of the ground upon the other side; is it open or is built upon?—It is open partly.

1043. Lord *John Hay.*] Is the ground built upon outside the road?—Portions of it are built upon; but there is a great deal of ground which is not built upon.

1044. *Chairman.*] Are there three acres of ground not built upon?—Yes, more than that. Then I should state, further, that I consider that if the reservoir is to be formed in the park, the time within which it is to be formed is a very important object. To the best of my judgment that reservoir can be constructed within 12 months; 12 months for the works, supposing the Act to pass this summer, and a limit of 18 months given, so as to allow time to prepare for it. That would get the reservoir completed before the summer after next; which I think is important, because it is quite clear that if this is to be laid out as ornamental ground, and afterwards to be cut up by engineering works of this kind, it would be most destructive.

1045. Mr. *Cripps.*] As an engineer, could it be done, the parties getting possession of the land at once, by Christmas 1868?—Yes; 18 months from the passing of the Act would be ample time, I am sure.

1046. Lord *John Hay.*] I think you said the summer after next; you mean the summer of 1869, do you not?—Yes.

1047. Colonel *Hogg.*] Do you not mean the summer of 1868?—No. Supposing the Act to pass in the autumn of 1867, then I propose to give them 18 months; a whole 12 months to do the work, and another six months to make their arrangements. That would bring us to the Christmas of 1868, or say the beginning of 1869. In the winter months it would not be so important, because the park would not be used. My object would be to get the whole thing cleared away before the spring of 1869.

1048. Mr. *Cripps.*] You probably would require to do a good deal of planting there?—A great deal of planting.

1049. With reference to the surface, that you assume is to be replaced?—I think the Board of Works should have control over that. I think that to make a mound standing out in the form of a reservoir above the ground, as shown in that plan, would be exceedingly ugly; and I think a little modification of that may make it accord with the general laying out of the ground.

1050. Colonel *Hogg.*] You think people would not take the villas if they had a huge thing up there?—I think it would be detrimental to the property. We are about to lay out a large sum of money to make that park, and I think it would be quite wrong.

1051. Mr. *Cripps.*] That particular plan, as submitted, I think, you do not approve of?—No; that has been designed, as Mr. Greaves stated, without knowing those arrangements; and therefore has not been made to accord with anything.

1052. There would be no substantial difficulty, would there, in altering that as you suggest?—No.

Cross-Examined by Mr. *Clerk.*

1053. Will you be so good as to tell me when this plan was prepared; is there a date upon it?—No, there is no date upon it.

1054. Was it this year?—No; it was prepared long ago. It has been modified a great many times, and I should think it has been finally approved and adopted now for at least six months.

1055. Was it in existence in February?—Yes.

1056. Now when our plan was sent to you, on the 9th of February, you never showed this to Mr. Greaves?—I do not think it would be any part of my duty to go to the different private companies and bodies who propose things in this metropolis, to point out to them what we propose to do.

1057. I do not expect it from the Metropolitan Board; but when a water company seeks to increase its supply, and asks for information, and sends its plans, you do not think proper to communicate what you propose to do?—I am not aware of their having asked for any information. Mr. Greaves knows perfectly well that if he had called upon me and asked for information, he would have had any information I could give him.

1058. Not without the order of the Board, I suppose?—Yes.

1059. Are you not aware that there are roads laid out over the whole of this *(pointing to the plan)*, and let out already?—There are buildings already over a good deal of the Seven Sisters-road, but there are places where there is no building at all.

1060. At those places where you say reservoirs might have been built, you say the levels are sufficient for the purpose?—I do not know the levels exactly, but there cannot be any great difference of level. The character of the ground is undulating.

1061. Is not the whole of this land in the neighbourhood of Seven Sisters-road laid out for building purposes already?—Not the whole of it.

1062. But along this part *(pointing to the plan)*?—I cannot speak to the whole of it.

1063. Have you under your Act for the Finsbury Park, any powers to turn this into a building

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building speculation?—I really cannot tell you what power we have under our Act.

1064. Let me call your attention to this; under the 9th Clause of your Act of 1857 you are to lay out, and plant, and enclose, the said park, and to build any lodge, or lodges, or other ornamental buildings therein, and in such manner as you think fit, and to cause any of the buildings which shall be on the hereditaments so to be purchased, to be pulled down, and apply the proceeds of the sale of the materials to any purpose as aforesaid.

The *Chairman* inquired whether there was not a provision to enable the Metropolitan Board of Works to let part of the land on building leases so as to reimburse them for the outlay.

Mr. *Clerk* read a Clause from the Finsbury Park Act.

1065. Mr. *Clerk* (to the *Witness*).] What extent of land do you propose to build upon here?—That is shown upon the plan.

1066. But how much is that; is it more than 20 acres?—I should say that it was more.

1067. It is proposed to let this on building leases, is it not?—I cannot tell you that; I have no doubt that the Board are acting under very good advice upon that point.

1068. I cannot see any power whatever to build upon this land; has any money been raised under the Act for the purpose of making this park?—I think so. My impression is that it has.

1069. Recently?—Sometime since, I should think.

1070. Can you say when?—I cannot tell that.

1071. You have spoken of an unsightly hump; what would be the greatest level above the ground of the surface of the ground above the reservoir; would it be three feet?—There is no scale upon my plan to show that.

1072. (To Mr. *Greaves.*) What would be the height?—Between three and four feet.

1073. (To Mr. *Bazalgette.*) That is so, is it not?—I will take it from Mr. Greaves that it is so; but an abrupt rise of three or four feet in an ornamental park is very objectionable.

1074. But it may be sloped off?—It is shown on your plan to be abrupt and being of a regular figure, I think that it would be exceedingly ugly.

1075. You want this to be under the control of the Metropolitan Board of Works, in order that they may have time to consider what plan should be approved of?—I did not say anything about their having time to consider; I meant that I did not wish to state off-hand at this moment what should be the position of the reservoir.

1076. But you might take 12 months to consider what should be done?—I do not think that it is at all likely that we should.

1077. But we have had no notice taken of our plan for several months?—Our proceedings are public. It is well known that, for some considerable period before you deposited your plans, we had taken that ground for Finsbury Park.

1078. You got your Act 10 years ago, as we know, but nothing has been done upon it, as we know also?—Yes; the land has been purchased.

1079. Supposing that you took 12 months to consider, how long should we have to construct our works?—That is supposing what is not at all likely to arise.

1080. We cannot tell that. How soon are you prepared to say that the company shall have possession of the land?—Within one month from the time that the sanction of the Board is given to it.

1081. And then we shall have a certain period for the construction of the works after the Board has thought fit to give its sanction to the construction of the works?—

1082. *Chairman.*] You mean the time to count after the plans have been settled for the construction of the works?—I think that one month would be amply sufficient to settle the plans, and do everything.

1083. The time you mention is after the plans have been approved and finally settled by the Board?—Yes; but of course I cannot bind the Board to give their sanction to any specified time.

1084. But the time for the construction of the reservoir would commence from the time of the plans being approved by the Metropolitan Board?—I think that if they had 15 months from the time allowed by the Board to construct the reservoir, that would be quite sufficient.

1085. Have you considered what would have to be done with all the spoil which would be dug out of this reservoir?—I think that the company should be required to remove the spoil out of the park, unless they have the sanction of the Board of Works. It may so happen that they may arrange to place some of the spoil so as to add to the ornamental character of the park, or so as not to detract from it.

1086. And you would provide that they should deal with the spoil under the sanction of the Metropolitan Board of Works?—I should provide that it might be left in the park in such a form as the Metropolitan Board of Works might direct.

1087. Colonel *Hogg.*] Is there any difficulty in public bodies or private individuals obtaining all necessary information which they may require from the Metropolitan Board?—None whatever.

1088. They could have found it out if they had chosen to inquire, could they not?—Without the least difficulty.

The *Chairman* stated that the company must be considered to have been aware that this land had been dedicated by Parliament to the purpose of a public park, and that whatever, works were constructed there must be constructed to the satisfaction and under the direction of the authority under whose control Parliament had placed the laying out of the park.

Mr. *Clerk* stated that the promoters of the Bill were perfectly willing to accept this condition, provided a reasonable limit of time was adopted.

The *Chairman* stated that a period of time should be given after the final decision as to the works being constructed, and that the necessity of inclosing the works with paling or railing, if it were required, would of course be involved.

Mr *Clerk* suggested that, in case of difficulty, it might be necessary to have some reference.

The *Chairman* stated that Parliament had placed this park under the control of a recognised authority, and that no such thing as a reference was necessary.

[Adjourned to To-morrow, at Twelve.

Wednesday, 29th May 1867.

MEMBERS PRESENT:

Mr. Ayrton.
Mr. Henry Baillie.
Mr. Benyon.
Mr. Sclater-Booth.
Lord Frederick Cavendish.
Lord John Hay.
Mr. Headlam.
Colonel Hogg.
Mr. Kekewich.

ACTON SMEE AYRTON, Esq., in the Chair.

EAST LONDON WATER (VARIOUS POWERS) BILL.

Mr. *Cripps* was heard to address the Committee on behalf of the Metropolitan Board of Works in opposition to the Bill.

Mr. *Clerk* was heard in reply.

The Committee-room was cleared.

After some time the Counsel and parties were again called in.

The *Chairman* stated that the Committee were of opinion that the preamble of the Bill was proved; and that they had come to the following Resolution:

"That the Committee, in passing the preamble of the Bill, reserve the consideration of any amendments which they may deem it expedient to recommend in the Water Supply Act of 1852."

The clauses of the Bill were proceeded with.

On Clause 4,

Mr. *Delano* applied for an alteration of the clause.

The Committee deliberated.

The *Chairman* stated that, as no appearance had been entered upon the applicant's petition, his application could not now be heard.

The clauses of the Bill were proceeded with.

On Clause 34,

Mr. *Pember* proposed that, in line 14, the words, "the said Trustees," should be inserted.

Mr. *Clerk* proposed that the following proviso should be inserted: "That nothing in this Act contained shall take away, lessen, alter, or prejudice any of the rights or privileges of the River Lea Trustees under the Water Act of 1855, or otherwise, or shall authorise the Company to diminish the respective quantities of water by that Act secured to the trustees for the purposes of the River Lea Navigation."

Mr. *Pember* assented to the alteration, and proposed the following clause, 34 A: "In case the Company in the construction of any work authorised by this Act shall divert, lessen, or impede to a greater extent than they are empowered to do under the River Lea Act of 1855, any of the water at present available for the working of Chingford Mill, or shall in any way, to such greater extent as aforesaid, lessen the water rights at present pertaining to the said mill, or shall take any part of the land or other appurtenances heretofore demised or enjoyed in conjunction therewith, then, and in such case, the Company shall, at the request of the trustees of the River Lea, purchase the said mill at a price to be fixed by arbitration, in accordance with the clauses of the Lands Clauses Consolidation Act, unless they otherwise agree."

Mr. *Clerk* was heard against the insertion of the clause.

The clause was postponed.

After some time the clauses were again proceeded with.

On Clause 34,

Mr. *Pember* stated that a clause had been handed to him which he could not consider, because the solicitor instructing him could not take the responsibility of agreeing to it without consulting the River Lea trustees; and he proposed a recurrence to the clause originally proposed by him.

Mr. *Clerk* supported the clause proposed by the promoters, and objected to the clause proposed by Mr. Pember.

Mr. *Pember*, in reply, requested that if the Committee did not accept his clause, they would not accept the clause proposed by the promoters; and stated that he would reserve his further opposition to the Bill for another place.

The clauses of the Bill were proceeded with, and severally passed, amendments being made therein.

The *Chairman* was directed to report the Bill, as amended, to the House.

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EAST LONDON WATER WORKS (THAMES SUPPLY) BILL.

Mr. *Cripps* was heard to address the Committee on behalf of the Metropolitan Board of Works in opposition to the Bill.

Mr. *Clerk* was heard in reply.

The Committee-room was cleared.

After some time the Counsel and parties were again called in.

The *Chairman* stated that the Committee were of opinion that the preamble of the Bill was proved; and that they had come to the following resolution: "That the Committee, in passing the preamble of the Bill, reserved the consideration of any amendment which they may deem it expedient to recommend in the Water Supply Act of 1852."

The clauses of the Bill were proceeded with.

On Clause 19,

Mr. *Cooper*, appearing for the vestry of St. Pancras, raised an objection, but his objection was removed by a declaration on the part of the promoters.

On Clause 20,

Mr. *Denison* was heard on behalf of the Conservators of the River Thames against the exception contained in the proviso at the end of the clause with regard to floods.

Mr. *Hope Scott* was heard in support of the clause.

The *Chairman* suggested that a clause should be prepared enacting that the companies should fix a gauge, at their own expense, upon which the conservators of the river should mark what they considered to be flood water, beyond which mark the company might take the water for nothing.

The clause was postponed.

Mr. *Denison* on behalf of the Conservators of the River Thames proposed a series of manuscript clauses, from 20 A to 20 G, which were accepted by the promoters of the Bill.

The clauses of the Bill were proceeded with.

On Clause 30,

Mr. *Cooper* inquired how the blank for the number of feet was to be filled up.

Mr. *Rees* stated that the blank would be filled up by the word 60.

Mr. *Cooper* accepted the clause as filled up.

On Clause 31,

Mr. *Cooper* proposed that the words One shilling and sixpence, be altered to One shilling and ninepence.

Mr. *Theodore Martin*, appearing for the parish of Kensington, stated that his clients thought One shilling and ninepence was the minimum.

The *Chairman* desired that evidence might be called upon this point.

Mr. WILLIAM BOOTH SCOTT, sworn; Examined by Mr. *Cooper*.

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1089. ARE you Chief Surveyor for the parish of St. Pancras?—I am.

1090. Have you been so since the passing of the Local Management Act of 1855?—I have.

1091. Will you state how many miles of paving there are in that parish under your control?—About 80 miles of roads.

1092. And how much of that is paved with granite?—With granite blocks, about 20 miles.

1093. And how much is metalled with granite?—About 40 miles.

1094. In your experience with the Imperial Gas and other companies passing through your parish, when a deep cutting is made, is it possible to complete it at one gravelling?—It is possible, but it is never done so, because the companies never have the trenches properly filled in.

1095. In practice, would it be possible to restore a road to its proper state after it was made, under 1 *s.* 9 *d.* a yard?—I think not.

1096. I believe that your opinion is that it ought to be up to 2 *s.*, if it costs as much?—Decidedly.

1097. We do it for the Imperial Company?—Yes.

1098. And does it cost us that?—Yes, we charge 1 *s.* 6 *d.*; and subsequently, on a subsequent settlement, we charged another 1 *s.* 6 *d.*; we have a second voucher.

Cross-examined by Mr. *Clerk*.

1099. You have different water and gas companies in your parish?—We have.

1100. You mentioned the Imperial, I think?—Yes.

1101. Are you talking of paving, or metalling?—Metalling.

1102. Metalling with granite?—Metalling with granite.

1103. What does the Imperial Company pay you; you do the work, and they pay you for it?—Yes, they pay us 1 *s.* 6 *d.* a yard for flint roads and granite; the one costs us more than the 1 *s.* 6 *d.*, and the other less, to reinstate.

1104. And you take 1 *s.* 6 *d.* for the whole?—Yes.

1105. That is all they pay?—Yes.

1106. Can you tell me any water company that you have?—Yes, the New River Company and the West Middlesex; they pay the same.

1107. One shilling and sixpence for granite roads?—One shilling and sixpence for granite and flint.

1108. It is all granite and flint, is it; you have no other metalling in your parish, but granite and flint?—No.

1109. And they pay you 1 *s.* 6 *d.*?—Yes.

1110. Does any company, either a water company

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pany or a gas company, pay you more than 1 *s.* 6 *d.*?—No.

1111. And you have been there since 1855?—Yes.

1112. *Chairman.*] I do not understand what you said about doing it twice over?—That is in paved roadways.

1113. That is a different thing altogether, is it?—Yes; for the granite roads and the flint roads we charge 1 *s.* 6 *d.*, but the flint roads cost less to reinstate than the granite roads.

1114. Mr. *Clerk.*] And of course there is always soil to spare when a new pipe is laid down, and the object is to pave it as close as you can?—Yes.

1115. Are there not some companies who pay you less than 1 *s.* 6 *d.*?—None at all.

1116. Are there not some that pay you 1 *s.*?—I think 1 *s.* 6 *d.* is the established price.

Re-examined by Mr. *Cooper.*

1117. Is there an after-payment from the Imperial Gas Company?—In paved roadways, the roads which will be disturbed by this company are all granite roads, macadamised with granite; they do not pass through any of our flint roads.

1118. And the 1 *s.* 6 *d.* is the average, flint and granite?—One shilling and sixpence is for the average flint and granite.

1119. You only give us 1 *s.* for flint?—They do not pass through any of our flint roads.

1120. Colonel *Hogg.*] Do you always observe a subsidence in the paving of roads, after they have been passed through by a gas company or water company?—Invariably.

1121. Mr. *Benyon.*] But if there is any deficiency in the execution of the work, it is your own fault, is it not?—No, because we do not fill the trench in; we simply reinstate the surface.

1122. But you do not give a certificate to the company until it is properly executed?—We have nothing to do with that; they excavate the trench, and lay in the pipes, and fill it in. If the trench were properly rammed, the surface would not subsequently settle; but the trench is filled in carelessly, and is not properly rammed, and then it settles, and we have to add to the surface.

1123. But you do not give them their vouchers until it is properly rammed, or, if you do, it is your own fault?—We give no vouchers or certificate; we simply follow them, and reinstate the surface. If the subsoil has been improperly filled in, it settles, and of course the surface drops with it, however well the surface may be finished; and then we have to add to the surface, to keep it up to a safe level; we have no control over the manner in which they fill in their trenches.

1124. Mr. *Clerk* (through the *Committee*).] I asked whether some company did not pay you less than 1 *s.* 6 *d.* I now hold in my hand the Act of the West Middlesex Company, and I see that, with regard to regulating the payment for damage done to metropolitan roads, in consequence of their works, the company are required to pay, on demand, to the Commissioners, a sum not exceeding 1 *s.* for every superficial yard of the roads.

Mr. *Cooper* stated that that applied to the metropolitan turnpike roads, and had nothing to do with the parish roads.

Witness.] I know we charge them 1 *s.* 6 *d.*

The *Chairman* remarked that all the roads were now vested in the parishes.

1125. Mr. *Clerk* (to the *Witness*).] With regard to the roads, I understand you to say there is no difference of charge in your parish?—None at all. It so happens that none of the roads along which the West Middlesex mains are laid in our parish were metropolitan turnpike roads, so that the question has never arisen between us; but the fact is that, for the last 10 or 12 years, we have charged them 1 *s.* 6 *d.* a yard.

[The Witness withdrew.

After some discussion,

Mr. *Theodore Martin* stated that he proposed now to call Mr. Broadbridge, the surveyor for the parish of Kensington.

Mr. James Broadbridge, sworn; Examined by Mr. *Theodore Martin.*

Mr. *J. Broadbridge.*

1126. Are you Surveyor for the parish of Kensington?—I am.

1127. Are the roads under your charge?—They are.

1128. Have you had large experience of the cost occasioned by the breaking up of those roads by gas and water companies?—I have for the last 16 years.

1129. What have you found to be the average cost of breaking up such roads as would be broken up under this bill?—I am of opinion that 2 *s.* should really be the price paid for it. The sums which we have had from the companies, ranging from, I think, 1 *s.* 6 *d.* to 1 *s.* 8*d.*, or 1 *s.* 9*d.*, I have not found to be sufficient to reinstate those roads in their original state, which, I think, we are bound to see is done.

1130. Do you find that great injury is done to the part of the road which is not broken up as well as to that which is broken up?—There must necessarily be great traffic upon that portion during the progress of the works of the companies.

1131. Do you know the length through your parish through which those mains are proposed to be carried?—From Kensington Palace Gardens to Shepherd's Bush.

1132. From end to end?—From end to end.

1133. The Uxbridge-road?—Yes; a most important road, being on a hill rise and a very steep gradient; and my opinion is, that the traffic and the expense on that particular hill would be greater than if it were on a flat.

1134. Do I understand you to say then that the 1 *s.* 6 *d.*, 1 *s.* 8*d.*, and 1 *s.* 9 *d.*, which you have been in the habit of receiving from the other companies, does not cover the expense?—Not for the granite roads.

1135. And you think that the sum which ought to be asked is a maximum of 2 *s.*?—A maximum of 2 *s.* Kensington vestry would be satisfied with 1 *s.* 9*d.*, with a certain control over the filling in of the trench.

1136. You have heard the words proposed to be added, giving you a supervision of the filling up of the excavations; does that involve in itself

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an extra expense on your part?—It would necessarily do so in a large work of that description, inasmuch as I should have to appoint a proper man to stand over and see that the works were properly done.

Cross-examined by Mr. *Clerk.*

1137. The additional cost, as I understand, is that the earth is not sufficiently rammed in, in the first instance, into the trench, and that there is a sinking afterwards?—It must always be so.

1138. Under the general Act you have no control, I believe, over the filling in by a gas company or water company, of the trench?—I do not know.

1139. The Act will speak for itself?—Yes.

1140. *Chairman.*] Have you exercised any such power?—Not any legal power; only the moral power. When I have found that the works have been going on wrong I have written to the companies, and it has been put right.

1141. Mr. *Clerk.*] The mains of this Company will run about one mile through Kensington parish, will they not?—I should think about one mile.

1142. Are the West Middlesex Company at present laying down a main in the parish?—They are.

1143. Within three days after that main was laid down, was not the road used again as if there had been no main laid there at all?—Hardly, as if no main had been laid there at all. It was a trench three or four feet wide, and of course it was patent to everybody going along that there had been an excavation all the way along.

1144. With regard to this, you had no control as to how the earth was rammed in?—We have the control over them that, having transacted business with them for so many years, I have only to write and request certain things to be done, and they are done.

1145. *Chairman.*] Did that trench settle down after they had paved it?—It is only just done; indeed they are on it now, but I have noticed for years and years that it is perhaps four years before the road will resume its original state where a trench has been.

1146. Mr. *Clerk.*] What do the West Middlesex Company pay you?—I think it is 1 *s.* 8 *d.*, but I cannot bear it in my memory now.

1147. Is it more than 1 *s.*?—Yes, I think it is 1 *s.* 8 *d.*

1148. I should be very glad if you could have told us certainly, because my impression is that it is no more than 1 *s.*?—I think it is 1 *s.* 8 *d.*, but I am quite sure it is more than 1 *s.*

Re-examined by Mr. *Theodore Martin.*

1149. In this case referred to, whether the trench has settled or not, do you adhere to the evidence that the damage done to your road would not be compensated by 1 *s.* 6 *d.* per superficial yard?—Certainly not.

1150. *Chairman.*] What is that sum of 1 *s.* 8 *d.* which you have mentioned, paid for?—For granite roads.

[The Witness withdrew.

Mr. Charles Greaves, called in; Examined by the *Committee.*

Mr. *C. Greaves.*

1151. *Chairman.*] Can you tell the Committee what is the actual cost of the paving of the different roads?—One shilling for repairs of gravel roads; 1 *s.* 6 *d.* for repairs of granite and macadamised roads, and 1 *s.* 9 *d.* for repairs of pitch paving.

[The Witness withdrew.

Mr. *Clerk* called attention to the Pneumatic Despatch Company's Act.

Mr. William Booth Scott, recalled; Examined by Mr. *Cooper.*

Mr. *W. B. Scott.*

1152. What has been the cost of repaving these roads?—We pay 1 *s.* 6 *d.* per superficial yard for one coat of gravel three inches thick.

1153. *Chairman.*] Did the Pneumatic Despatch Company pay that?—That was a paved roadway; 1 *s.* 8 *d.* will be the actual cost of a square yard of broken granite.

> Mr. *Broadbridge.*] After the trench has become consolidated, it is found necessary to recoat that trench once, or twice, or more, within the four years afterwards, and it would cost 1 *s.* 8 *d.* per superficial yard for reinstating that trench.

1154. *Chairman.*] What is the thickness with which the roads are coated with granite?—They should be just a stone thick; about two and a half or three inches thick. The Uxbridge-road in my district is from Palace Gardens down to Shepherd's Bush.

1155. How deep is that laid in granite?—It is consolidated now before it is touched. It is six or eight inches, and in some parts three or four inches thick.

1156. What is the thickness of the granite on the lighter and cheaper roads?—Most of the granite roads would cost about the same, excepting where the traffic is in excess.

1157. Do you mean that they are all coated with the same thickness of granite?—We coat them all one layer thick. That would be the proper way of repairing a road.

1158. Mr. *Clerk.*] From 2½ to 3 inches?—From 2½ to 3 inches.

1159. *Chairman* (to Mr. *Greaves*).] How far do the granite roads extend along the line of the mains?—More than 20 miles.

1160. Mr. *Henry Baillie.*] What is the length of road that you turn up?—The length of the works is 23 miles of road.

1161. How much of that is gravel, and how much is granite?—That we have not taken out.

1162. *Chairman.*] Does the granite extend beyond the metropolis?—Not beyond Hounslow. From Hounslow inwards it would be granite. All Notting Hill would be granite.

1163. Mr. *Theodore Martin.*] When it gets out of Kensington parish, and between that and where you lay your mains to the river, it is not granite; from Shepherd's Bush, westward?—No, two-thirds would be granite, and one-third gravel.

1164. Mr. *Clerk.*] Marylebone and Islington, which are granite parishes, are all satisfied with the price, are they not?—Yes.

The Committee deliberated.

The *Chairman* stated that the Committee would leave the clause as it was in the Bill.

The clauses of the Bill were proceeded with.

After Clause 35,

Mr. *Cooper* proposed a clause to extend to this Act the clauses of Michael Angelo Taylor's Act.

Mr. *Clerk* stated that the promoters would have no objection to the clause, if it were made to apply only so far as it applied to any other companies in the metropolis.

Mr. *Cooper* assented to this proposal.

The clause was inserted.

Mr. *Cooper* then proposed a clause as to the expense of the repairs.

The clause was accepted and inserted.

Mr. *Cooper* then proposed a clause giving power summarily to recover penalties and moneys, but did not press it; he also proposed a clause giving facility of reference to the President, for the time being, of the Institution of Civil Engineers.

Mr. *Clerk* argued against the clause.

The *Chairman* stated that there would be great inconvenience in having a special referee in this case.

The clause was rejected.

Mr. *Cooper* then proposed a clause to compel the East London Water Company to supply the parish of St. Pancras in their passage through the parish with water for flushing the sewers, and for other public purposes when required.

Mr. *Clerk* urged against the clause that the notice required by the Standing Orders had not been given, and that, therefore, the clause could not be inserted.

The *Chairman* stated that the Committee would not insert the clause.

Mr. *Cooper* proposed a clause as to making up local rates in the parish of St. Pancras.

Mr. *Clerk* was heard against the insertion of the clause.

Mr. *Cooper* was heard in reply.

The *Chairman* stated that the Committee would alter the clause so as to make it similar to the clause inserted in the Railway Acts.

Mr. *Clerk* stated that there were certain alterations in the clauses as to Finsbury Park, to which the Metropolitan Board of Works had agreed, but that there were others to which they had not agreed.

Mr. *Cripps* explained the objections of the Metropolitan Board of Works, and proposed certain alterations.

The *Chairman* stated that the Committee would accept Mr. Cripps' proposed alteration.

Mr. *Clerk* proposed an amendment (as to arbitration) to the clauses brought up by Mr. Cripps.

Mr. *Cripps* objected to the proposed amendment.

The *Chairman* stated that the Committee must leave the promoters of the Bill to their ultimate remedy, because it would have been a question between rejecting the Bill altogether and admitting them into the Park *sub modo*, and that the clause would stand.

On Clause 20 (*which had been postponed*),

The *Chairman* inquired whether both parties were satisfied with Clause 20.

Mr. *Clerk* read the clause proposed to meet the objections of the Conservators of the Thames.

Mr. *Sargent* objected to the clause proposed, and argued in support of his objection.

The *Chairman* stated that if Mr. Sargent would not take the responsibility of acquiescing in the settlement of the clause, it had better be left to the other side.

Mr. *Sargent* declined to express any further opinion upon the matter.

The clause was therefore passed with amendments.

The clauses of the Bill were proceeded with and severally passed, amendments being made therein.

The *Chairman* was directed to report the Bill, as amended, to the House.

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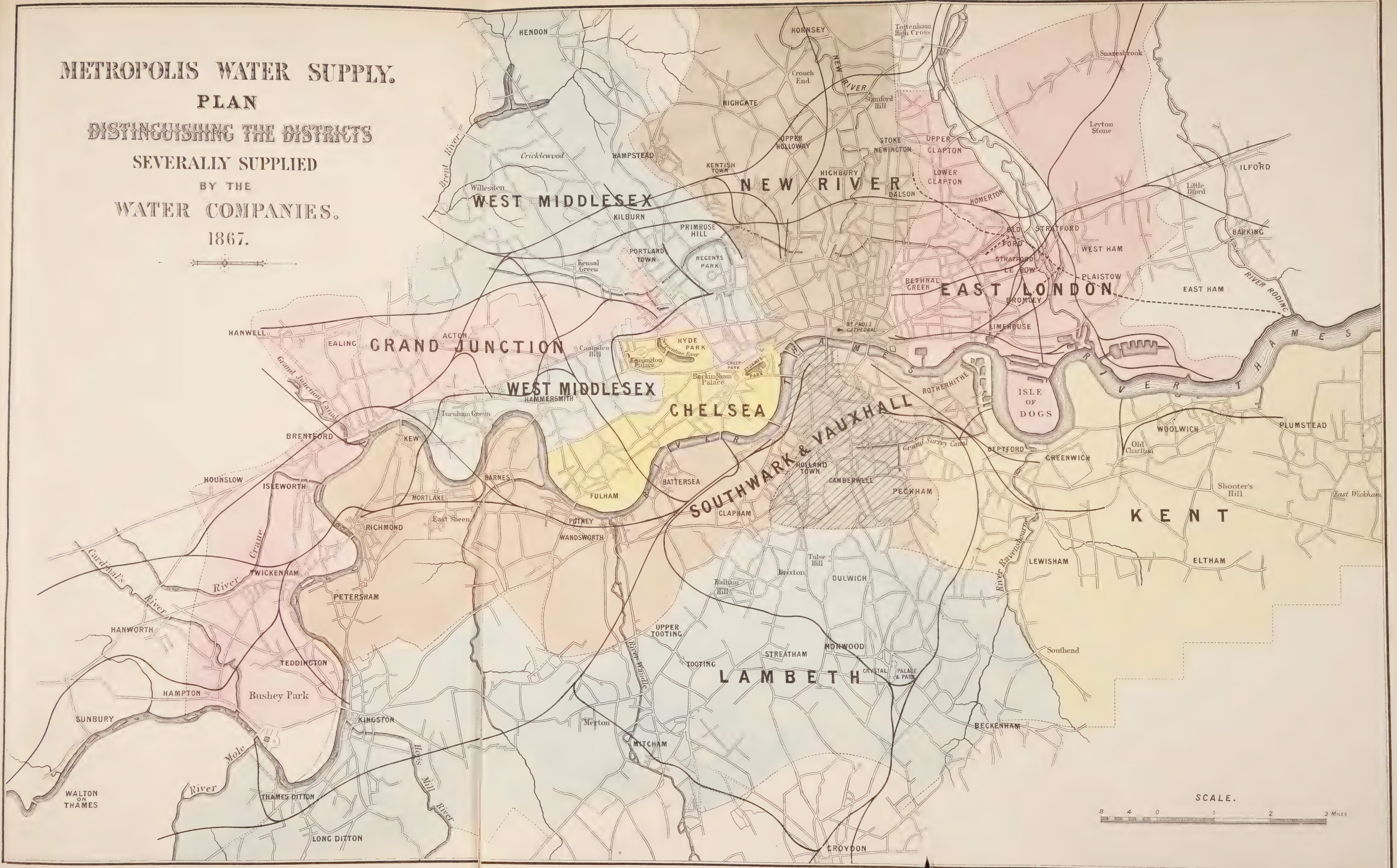

METROPOLIS WATER SUPPLY.
PLAN
DISTINGUISHING THE DISTRICTS
SEVERALLY SUPPLIED
BY THE
WATER COMPANIES.
1867.

WEST MIDDLESEX
NEW RIVER
EAST LONDON
GRAND JUNCTION
WEST MIDDLESEX
CHELSEA
SOUTHWARK & VAUXHALL
LAMBETH
KENT
HENDON
HORNSEY
Tottenham High Cross
Crouch End
NEW RIVER
Stamford Hill
HIGHGATE
Snaresbrook
Leyton Stone
Brent River
Cricklewood
HAMPSTEAD
UPPER HOLLOWAY
STOKE NEWINGTON
UPPER CLAPTON
LOWER CLAPTON
KENTISH TOWN
HIGHBURY
DALSON
HOMERTON
ILFORD
Little Ilford
Willesden
KILBURN
PRIMROSE HILL
OLD FORD
STRATFORD
BARKING
PORTLAND TOWN
RECENTS PARK
WEST HAM
Kensal Green
STRATFORD LE BOW
PLAISTOW
BETHNAL GREEN
EAST HAM
BROMLEY
RIVER RODING
ST PAULS CATHEDRAL
LIMEHOUSE
HANWELL
ACTON
EALING
HYDE PARK
Kensington Palace
Serpentine River
GREEN PARK
ST JAMES PARK
Campden Hill
Buckingham Palace
THAMES
RIVER THAMES
ROTHERHITHE
ISLE OF DOGS
Grand Junction Canal
HAMMERSMITH
Turnham Green
BRENTFORD
KEW
RIVER
Grand Surrey Canal
DEPTFORD
WOOLWICH
PLUMSTEAD
Old Charlton
GREENWICH
HOLLAND TOWN
CAMBERWELL
HOUNSLOW
ISLEWORTH
BARNES
BATTERSEA
PECKHAM
Shooter's Hill
East Wickham
MORTLAKE
FULHAM
CLAPHAM
East Sheen
RICHMOND
PUTNEY
WANDSWORTH
River Crane
Cardinal's River
TWICKENHAM
Tulse Hill
Brixton
DULWICH
River Ravensbourne
LEWISHAM
ELTHAM
Balham Hill
PETERSHAM
HANWORTH
UPPER TOOTING
River Wandle
NORWOOD
STREATHAM
Southend
TEDDINGTON
TOOTING
CRYSTAL PALACE & PARK
HAMPTON
Bushey Park
SUNBURY
KINGSTON
Merton
BECKENHAM
MITCHAM
River Mole
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WALTON ON THAMES
THAMES DITTON
LONG DITTON
CROYDON
SCALE.
8 4 0 1 2 3 MILES

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2. *Contamination of Water in Cisterns; Importance of Inspection and of frequent Cleansing.*
3. *Question as to the Expediency of Cisterns in connection with a constant Supply.*
4. *Want of an Improved Provision of Cisterns under the present System; Outlay necessary.*
5. *Ample Supply of Water, if the Cisternage were adequate.*
6. *Want of Improved Fittings to Cisterns; great Waste in consequence.*

1. *Existing Requirements as to the Provision of Cisterns.*

Obligation under the Act of 1852 in regard to the provision of cisterns in connection with a constant supply, *Rep.* xiv. xvi.——Provision under the Act of 1847 in regard to cisterns being furnished when the supply is on the intermittent system, *ib.* xv., xvi.

2. *Contamination of Water in Cisterns; Importance of Inspection and of frequent Cleansing:*

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5. *Ample Supply of Water if the Cisternage were adequate.*

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11. *As to the use of a Ferrule for limiting the Orifice of supply.*
12. *Arrangements made by the Several Companies for providing a Constant Supply: limited applications made for such Supply.*
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14. *Conclusions and Recommendations of the Committee.*

1. *Generally as to the Comparative Advantages of Constant and Intermittent Supply.*

Effect of a constant supply that all the pipes are always charged up to the ball-cock of the cistern, whilst under an intermittent supply the services are only charged during the time of the supply, *Greaves* 787–800. 812.

Necessity of investigation as to the circumstances attending the adoption of constant supply in each town before arriving at any conclusion as to the superiority of the system in each case, *Simpson* 1100–1103——Admission that the constant system of supply possesses advantages equal probably to those of the intermittent system; it is however attended with many inconveniencies and difficulties, *ib.* 1151–1158.

Examination relative to several towns where the system of constant supply has been resorted to; witness is not aware of any instance of a return to the intermittent system, *Simpson* 1237–1262——Limited advantage of constant over intermittent pressure, as regards the quality of the water when drawn for consumption, *ib.* 1264–1268. 1305, 1306.

Statement in report of Captain Tyler that there can be no doubt of the advantages of a constant supply any more than of the difficulties in carrying it out, *Quick* 1535——Preference expressed by witness under any circumstances for the intermittent system as compared with the constant system, *ib.* 1554–1564.

Great waste and great public complaint during the attempted supply of Plumstead on the constant system; general satisfaction given and great economy of water by the intermittent system, *Morris* 1920–1927——Witness is very favourable to the principle of constant supply, but sees great difficulty in getting over the inordinate waste under the system, *ib.* 1928–1930. 1956–1960.

Further statement in approval of a constant supply by witness's company if by means of improved fittings and strict supervision an adequate check could be given to wilful or careless waste, *Morris* 1956–1963. 2149–2156——Similar charge made for the water under the constant system if there be protection against waste, *ib.* 2131.

Explanation that witness is not the originator of the system of constant supply but is a strong advocate of the system, *Bateman* 2440, 2441——Summary of witness's views as to the advantages of constant supply, and as to the regulations necessary in order to carry it into successful operation, *ib.* 2527. 2543–2552.

Conclusion, based on witness's experience at Edinburgh, as to the decided advantage of the constant over the intermittent system, *Ramsay* 2708, 2709——Belief that the constant system might be introduced into London with great advantage both to the consumers and the companies, *Tomlinson* 3102–3109——Less cost in giving a constant supply in London

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1. *Generally as to the Comparative Advantages, &c.*—continued.

London, and less quantity of water required, if proper precautions are taken, than in continuing upon the intermittent system, *Tomlinson* 3106–3109.

Important advantages of a constant supply where the mains are properly laid and where there are effectual precautions against waste, *Rawlinson* 3695——Witness has no practical experience of any place where the intermittent system was abandoned for the constant system, *ib.* 3779–3785.

Statement in report by Dr. Letheby as to the superior advantages of a constant supply, if it could be efficiently carried out, the practical difficulties being however immense, *App.* 315, 316.

2. *As to the Supervision necessary under the Constant System:*

Intrusive supervision necessary under the constant system, *Muir* 148 ——Necessity of strict supervision, where meters are not used, in order to prevent waste under the constant system, *ib.* 346 348——Strict supervision found necessary in the case of some houses having a constant supply from the New River Company without meters, *ib.* 508–510——Objection to the constant system on account of the continual espionage necessary in order to prevent waste, *Simpson* 1067, 1068. 1188, 1189——Great objection of the inhabitants to submit to the close control required under the constant system, *ib.* 1302–1304.

Grounds for concluding that very close supervision would be required under the constant system, *Quick* 1528, 1529. 1593–1595——Very close supervision necessary under the constant system: dislike of the public thereto, *Hack* 1728–1730. 1789–1791——Constant inspection required, with a view to keeping the fittings in order for a constant service, *ib.* 1812, 1813.

Necessity of a sort of water police in conjunction with a constant supply, *Morris* 1929. 2151–2155——Great objection of the public to constant inspection of the taps and fittings, *ib.* 2128.

Defence of the proposition for a vigilant inspection, and, if necessary, for severe measures, in order to prevent wilful waste by consumers in London under a constant supply, *Bateman* 2608. 2621–2635——Necessity of the appointment of inspectors under the constant system, *ib.* 2678–2681.

Doubt as to any very close inspection being required if the constant system were properly checked when first introduced, *Tomlinson* 3116–3123——Statement as to the necessity of constant supervision whether the supply be constant or intermittent, *Rawlinson* 3723. 3725. 3815–3818. 3824–3826——Suggestions as to the mode in which supervision should be exercised in London, if the supply were constant: stringent measures recommended where waste is persisted in, *ib.* 3736–3741. 3818–3826.

3. *Dwellings of the Lower Classes:*

Advantage if such arrangements were compulsory as would admit of a constant supply to the dwellings of the lower classes without waste, *Muir* 415–432. 471–490——Suggestions as to the arrangements desirable in connection with a constant supply to the smaller class of houses, *Simpson* 1379–1383. 1406–1412; *Quick* 1565–1587——Leakage and dampness likely to arise from constant pressure in the poorer class of houses, *Letheby* 2299, 2300——Opinion as to the great advantage of a constant supply, especially for the poorer classes, if the fittings and appliances could be kept in proper order, *ib.* 2316, 2317.

In the poorer houses, more especially, a constant supply would be a great advantage, *Tomlinson* 3103——Decided advantage of constant over intermittent service for all houses of the poorer class, *Easton* 3480, 3481——Results of an inquiry made by witness into the water supply of the poorer class of houses in different parts of London: urgent want of a constant service for many of these houses, *ib.* 3499–3511——Proposition for serving small houses by means of separate service pipes communicating with a tank or cistern calculated to hold a sufficient supply for a certain number of such houses, *Rawlinson* 3709–3728.

4. *Alterations necessary on the Score of Pipes and Fittings:*

Impracticability of a constant supply of water to the consumers in London, by means of the fittings now in use, *Muir* 137–142——Stronger pipes required, and greater risk of bursting, in the case of constant service than of intermittent service, *Simpson* 1095–1099. 1269–1275——Greater pressure on the pipes under the constant than the intermittent system, the present pipes not being strong enough under the former system, though sufficient under the existing system, *Quick* 1573–1592. 1662–1666——Objection to a mere pipe and tap for giving a constant supply, *ib.* 1637.

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4. *Alterations necessary on the Score of Pipes and Fittings*—continued.

Grounds for concluding that the adoption of constant pressure in London would not necessitate new and stronger communication pipes, *Bateman* 2490-2497. 2506-2508——Necessity of a new tap, but of nothing else, in the majority of cases, in changing from intermittent to constant supply, *ib.* 2501-2508——Expediency and facility of the supply to water closets, under the constant system, being regulated by a waste preventer, *ib.* 2550. 2561-2563. 2661-2663——Question further considered as to the strength of the pipes in London, with reference to the pressure under a constant supply, *ib.* 2591-2602.

Effective check upon waste, by placing taps where there are not sinks underneath, *Ramsey* 2782, 2783——Statement as to the advantage of an improved description of tap, which acts by a screw, as some check upon waste under a constant supply, *ib.* 2841-2850. 2877, 2878——Necessity of brass taps, *ib.* 2923-2929. 2952——Contemplated use of iron taps with brass working cocks, *Tomlinson* 3200-3203.

Statement relative to the long period for which witness's firm has supplied large quantities of pipes in London, sufficiently strong to bear the alteration from intermittent to constant pressure, *Easton* 3517-3530——Importance of the waste pipes of cisterns being brought into some conspicuous place, as a check upon undue waste under the constant system: difficulty thereon, *ib.* 3531-3539——Approval of a pipe and tap direct from the main for drinking purposes: means of preventing waste in such case, *ib.* 3542-3545——Large supply of lead pipes in London by witness's firm further adverted to, *ib.* 3594-3599. 3634-3636.

Necessity of increasing attention being paid to the taps, &c. where the constant system is in force: great facility in applying new taps, *Rawlinson* 3703-3706——Consideration of the question of "water waste preventers," in connection with constant supply: disapproval generally of these contrivances, except as regards water closets, *ib.* 3719. 3730-3734. 3800-3814. 3827-3830.

5. *Cost of New Fittings for the Constant System:*

Estimate of 8 *l.* per house, or more than 3,000,000 *l.*, as the cost of providing for a constant system in the metropolis, *Muir* 144-156——Causes of the heavy expense of new fittings for a constant supply, *ib.* 414——Estimate of 2 *l.* per house as the average cost of altering the fittings for a constant supply throughout the East London district; exclusive of fittings for water closets, it might perhaps be done for 1 *l.* per house, *Greaves* 801-811. 832, 833.

Great expense involved in adapting the fittings in London to a constant supply, *Simpson* 1066, 1067——The first cost is less under the constant system than the intermittent system, but the expense of changing to the latter is a great difficulty, *ib.* 1187, 1188. 1263——Estimate of from 2,500,000 *l.* to 3,000,000 *l.*, as the cost of altering the fittings for a constant service throughout London, *ib.* 1296-1299. 1334, 1335——Great expense of the fittings for a constant supply further adverted to, *ib.* 1385, 1386. 1412. 1465——Less expense of the constant system when it is applied in the first instance, and is not an alteration from the intermittent system, *ib.* 1453-1456.

Opinion that the cost of changing, from the intermittent to the constant system, would be nearer 10 *l.* than 8 *l.* per house, *Quick* 1523. 1696, 1697——Very large expense of altering both the works and the fittings in connection with a constant service, *ib.* 1694-1700——Estimate of from 7 *l.* to 8 *l.* per house as the cost of altering the fittings for a constant supply, *Hack* 1724. 1752-1756——Estimate of about 5 *l.* per house as the cost of altering the fittings, and putting stronger pipes, for a constant supply in the district of the Kent Company, *Morris* 1946-1950. 1988-2010——Much less cost in applying the constant system to new houses, than in adapting the fittings in old houses, *Letheby* 2384.

Average of from 12 *s.* to 15 *s.* as the cost of applying the constant system to each cottage house in Manchester, &c. that is including the extension of the communication pipe from the wall into the house, the tap, and the labour, *Bateman* 2488, 2489. 2501——Conclusion as to the great exaggeration involved in the estimate of 8 *l.* or 10 *l.* as the average cost per house of applying the constant system in London, *ib.* 2504-2509. 2553——Probable sufficiency of the sum realised by old pipes to provide new ones of less weight, *ib.* 2504, 2505——Opinion as to the sufficiency of 1 *l.* for introducing a new pipe and tap into the poorer houses in London, whilst 2 *l.* would be sufficient if in addition a cistern, &c. were required, *ib.* 2509-2511.

Witness is convinced that the alterations necessary in introducing the constant system, the expense would not be anything like from 5 *l.* to 10 *l.* a house, *Bateman* 2553——Statement upon the question of cost in applying the constant system as affected by the question of supply to water closets, *ib.* 2636-2663.

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5. *Cost of new Fittings for the Constant System*—continued.

Great variation in the cost of altering existing fittings for a constant supply, *Ramsay* 2750——Statement of the expense of pipes and fittings for introducing constant service into new houses; much less cost than in introducing the intermittent system, *Tomlinson* 3124–3130——Small expense of renewing the ball-cocks for a constant service, *Easton* 3534, 3535——Small outlay required per house in changing from the intermittent to the constant system, *Rawlinson* 3742–3744.

6. *Question as to the Parties to bear the Cost of New Fittings:*

Unwillingness of the landlords to bear the expense of fittings necessary for a constant service, *Muir* 147–151——Belief as to the inoperativeness of Section 15 of the Act of 1852, unless the landlords or tenants are compelled to pay for new fittings for a constant supply, *ib.* 279–292——Interest of the companies in having good fittings if the constant system is enforced; argument, nevertheless, that the expense should not fall upon them, *ib.* 286–290. 351–353.

Unwillingness of the public to incur the expense necessary for the application of the constant system, *Hack* 1725–1727; *Morris* 2129——Dissent from the view that the water companies should be the parties to bear the expense of improved sanitary arrangements in the shape of constant water service, *Letheby* 2338——The expense of the fittings should fall upon consumers, *Bateman* 2696.

7. *As to the Liability of the Fittings to be Stolen;*

Belief that there would be constant depredations in respect of fittings, *Muir* 354–356; *Simpson* 1185, 1186.

Doubt as to the fittings for a constant supply being knocked away and stolen to any serious extent; checks suggested hereon in the poorer districts, *Bateman* 2664–2671——Use of brass taps in Edinburgh without their being ever stolen, *Ramsay* 2923–2929. 2952. 2955, 2956.

8. *As to the Amount of Waste under the Constant System:*

Recent experiment by the New River Company, showing that sixteen times the quantity of water was taken under the constant system, with the fittings now in use, as compared with the intermittent system, *Muir* 138——Large waste apprehended at night under the constant system, *ib.* 448——Further explanation in regard to its having been proved by experiment that the waste was excessive under the constant system as compared with the intermittent system, *ib.* 453–458.

Liability to great flooding and waste if the constant system be introduced without proper precautions, *Greaves* 834–836——Way in which the pipes are managed under the constant system where there are no cisterns: great waste of water, which it is almost impossible to prevent if waste pipes are allowed, *Simpson* 1059–1088——Means for checking waste under the constant system, as well as under the intermittent system, in connection with water closets, *ib.* 1170–1175.

Probability of the quantity of water fairly used being about the same under the constant system, if properly checked, and the intermittent system, *Simpson* 1276–1283. 1411, 1412. 1449–1452——Great difficulty as to the source of supply of London if the constant system be introduced, giving an unlimited quantity to each house, *ib.* 1288–1291. 1300–1302.

Unsatisfactory result of an experiment made by witness in applying the constant system to some houses of his own in St. George's, Southwark; enormous waste experienced, *Quick* 1545–1553——Great difficulty in preventing much waste under the constant system, *ib.* 1676–1679.

With proper fittings, there is nothing in a constant supply which should necessarily create a larger consumption than under the intermittent system, *Bateman* 2518, 2519. 2525, 2526. 2543——Waste under constant service chiefly by means of the waste pipes and by the water being allowed to run through the water closets, *Ramsay* 2930–2937.

9. *Question as to the use of Meters:*

Supply of about 1,200 houses by the New River Company upon the constant system, the supply being protected from waste, in about half these cases, by means of meters, *Muir* 178–185——Use of the meter in some cases of constant supply further adverted to; objection to the supply to private houses being checked by meter, *ib.* 491–493.

Obstacles to measuring the water consumed in each house as a check upon waste under the constant system, *Simpson* 1457–1464; *Morris* 2161–2163.

Proposition for the use of meters in connection with a system of constant supply in London; the cost would be well compensated for by the waste prevented, *Easton* 3495–3498. 3675–3684.

CONSTANT SUPPLY—continued.

10. *As to the use of Cisterns:*

Economy in applying the constant system to new houses if cisterns were not essential, *Muir* 311, 312——Requirement, under the Act of 1852, that cisterns be provided where constant service is afforded, *ib.* 312–317——Belief as to the use of cisterns being involved in a constant supply, *ib.* 365–369. 476, 477——Conclusion that the constant system must be accompanied with the use of cisterns for water closets, *Greaves* 724–767. 784–786. 837–840.

Use, generally, of cisterns in connection with the water closets where the system of constant supply has been adopted; great inconvenience of the system otherwise, *Simpson* 1055–1058. 1091, 1092——Importance of cisterns as checking the waste under the constant system, *ib.* 1400–1402——Check upon waste under a constant service if there were cisterns and ball-cocks, *Hack* 1757–1764——Approval of the use of cisterns, *Letheby* 2406.

Conclusion as to its not being necessary to provide cisterns in connection with a constant supply, except for water closets, *Bateman* 2546, 2548. 2636–2663——Practice in Edinburgh as to the use of cisterns; disapproval of these under the constant system, except as regards water closets and baths, *Ramsay* 2751–2757. 2780–2785——Admission as to cisterns being necessary for several purposes, even where there is a constant supply, *ib.* 2858–2864——Smaller cisterns required in the case of constant pressure, *ib.* 2921, 2922.

Evidence on the subject of the use of cisterns for domestic supply in Cambridge; grounds for objecting to cisterns where there is a constant service, except for water closets, *Tomlinson* 3041–3056. 3110–3113. 3231, 3232——The use of cisterns should be optional in London, *ib.* 3110–3112——Certainty of pure water, under the constant system, in the absence of cisterns, *ib.* 3233——Expediency of the cisterns being still retained in the better class of houses, *Easton* 3540–3543.

11. *As to the use of a Ferrule for Limiting the Orifice of Supply:*

Reduced size of the pipe in some cases of constant supply, there being nevertheless considerable waste, *Muir* 186–190——Objection to limiting the orifice through which the water runs in giving a constant service; room for much waste even under this arrangement, *Simpson* 1466–1471——Disapproval of the constant system, regulated by means of a ferrule, *Quick* 1638–1641.

Alterations necessary in the orifice or size of the pipes according to the different levels, if the constant system were compulsory, *Hack* 1824–1829——Approval of cisterns and of a regulated constant supply by means of a ferrule for the better class of houses, *Letheby* 2406–2409——Decided objection to the system of a ferrule as a means of preventing waste, *Rawlinson* 3810–3814. 3829, 3830.

12. *Arrangements made by the several Companies for providing a Constant Supply; limited Applications made for such Supply:*

Circumstance of no requisition having ever been submitted to the New River Company by the inhabitants, nor any preliminary steps taken with a view to obtaining a constant supply, *Muir* 160–177——Definition of the terms "main" and "district main" respectively, as bearing upon the question of a constant supply, and of application by a certain portion of the inhabitants served by any district main, *ib.* 163–177. 261–278——Examination with further reference to the New River Company not having been called upon to give a constant supply to any body of consumers under the Act of 1852; how far the company has made provision with a view to such supply, *ib.* 249–278——Preparation by witness's company of maps, as required by Section 172 of the Act of 1852; nothing has however been done on the part of the public towards obtaining a constant supply, *ib.* 293–303. 349, 350.

Nature of the information provided by the East London Company with reference to mains and district mains as relating to the question of applications for a constant supply, *Greaves* 571–581——Non-demand upon the Lambeth Company for a constant supply, *Simpson* 1130——There has been no formal request for a constant supply in the case of the Southwark and Vauxhall Company, *Quick* 1483——Absence of demand in the Grand Junction Company's district for a constant supply, *ib.* 1511–1513——There has been no requisition for a constant supply by the West Middlesex Company, *Hack* 1717–1723. 1744.

Examination to the effect that the Kent Company have complied with the requisition of the Act of 1852 in regard to setting forth on a map the mains and district mains, *Morris* 2014–2037——Single instance of application to the company by the local authorities for a constant supply, *ib.* 2169–2171.

Belief that if the constant supply were a crying necessity the provisions for its enforcement, under the Act of 1852, would be resorted to, *Letheby* 2318–2330.

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CONSTANT SUPPLY—continued.

12. *Arrangements made by the several Companies, &c.*—continued.

Statement in regard to the arrangements made by each company for constant supply, together with the views of the company as to the best mode of giving effect to Clause 15 of the Act of 1852, *App.* 256. 266, 267. 274. 280–286. 292–299.

Explanation as to the extent to which applications have been made, or measures have been taken, under Section 27 of the Act of 1852, with reference to the provision of a constant supply, *App.* 264. 271, 272. 277. 284. 290. 297. 301. 307.

13. *Peremptory Arrangement necessary in order to enforce the proper adoption of the Constant System:*

Compulsory legislation necessary in order to secure a general alteration of fittings, *Simpson* 1292–1295——Great practical difficulty in carrying out Captain Tyler's proposal that the water companies be required to prepare for constant service within a reasonable period by empowering them to provide the necessary fittings, and to charge the cost on the owners or occupiers, *Letheby* 2385–2391.

Necessity of large powers being exercised in London in order to secure the provision of efficient pipes and taps under the constant system, *Bateman* 2512–2518. 2527——Very valuable clauses in the Newcastle Waterworks Act, empowering the water company to compel the use of proper fittings, &c., *ib.* 2532–2534——Very peremptory powers contemplated in the water companies in order to protect themselves against undue waste under a constant supply, *ib.* 2545, 2546. 2552.

Approval generally of the clauses in the Newcastle Act with respect to a constant supply in London, *Bateman* 2603. 2608, 2609——Proposition that it be incumbent upon the companies to provide a constant supply within a given time, full power being given them to refuse such supply in all cases where proper fittings were not provided by the consumers, *ib.* 2672–2677. 2695, 2696.

Necessity of the companies having stringent powers over the taps and fittings, else the waste under constant supply would be enormous; exemplification of this in Edinburgh, *Ramsay*, 2710–2742——Great difficulty in the first instance in adapting the fittings in London to a constant service; compulsory regulations necessary in the matter, *Easton* 3685–3688.

14. *Conclusions and Recommendations of the Committee:*

Summary of the provisions of the Act of 1852, imposing upon the companies the obligation to afford a constant supply under certain conditions, *Rep.* xiv——Great difficulty in the application of the provisions of the Act of 1852 so as to bring about a constant supply in a complete or satisfactory manner, *ib.* xvi——Very great difficulty in preventing waste under the constant system, the difficulty being still greater in effecting a change from any system of domestic supply already established to another system, *ib.*

Recommendation that the Act of 1852 be amended by providing that every company should afford a constant supply of water to each house, so that the water may be drawn direct from the companies' pipes at all times during the twenty-four hours, with certain exceptions, *Rep.* xvi.

Necessity before introducing the constant system of making adequate provision against waste, *Rep.* xvi——Consideration of the causes of waste under the constant system, together with an enumeration of the means for checking or preventing such waste, *ib.* xviii, xix——Precautions suggested upon the subject of brass fittings, and their liability to be stolen, *ib.* xviii.

New arrangements suggested in regard to the provision of communication pipes, fittings, &c.; authority to be vested in the companies in this respect, *Rep.* xix.——The Committee do not think it desirable that any precise mode of effecting a constant supply should be laid down by Statute, but that the companies should be required, in conjunction with the Metropolitan Board of Works, to frame rules for the purpose, *ib.* ——Contemplated watchful supervision by the companies over the internal apparatus, *ib.* ——Necessity of each company carefully examining and putting in order the fittings in the district supplied by a main before the water is constantly laid on, *ib.* xxii.

Recommendation that the Metropolitan Board should be empowered to direct, from time to time, within what period the constant supply should be introduced into each separate street or district. *Rep.* xxii.

The Committee consider that power should be reserved to the occupiers of houses of above 20*l.* annual value, and not inhabited by more than a single family, to decline to avail themselves of a constant supply, *Rep.* xxii.

See also *Appeal. Arbitration. Brighton. Bursting of Pipes. Cambridge. Carlisle. Chester. Complaints. Croydon. Dwellings of the Lower Classes. East London Company. Edinburgh. Glasgow. Leeds. Manchester. Pipes and Mains. Provincial Towns. Rivers Pollution Commission. Waste of Water. Water Closets. West Middlesex Waterworks Company. Wigan. Woolwich.*

Constantinople.

Constantinople. Excellent arrangements at Constantinople for preventing waste of water, *Rawlinson* 3710.

Continental Towns. Introduction lately of the constant system into various towns abroad, *Easton* 3577, 3578.

Continuous Supply. Sundry details in connection with the system of continuous supply as carried out to some extent by the East London Company, *Greaves* 566 *et seq*——Very little difference between the system of continuous supply and constant supply; conclusion as to cisterns being generally used in connection with the latter system, *ib.* 763–783.

Corporations. Increasing administration of waterworks by corporations, *Bateman* 2679.
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Cost of Fittings, &c. (*Constant Supply*):

1. *Considerations as to the Expense involved in changing from Intermittent to Constant Supply.*
2. *Question as to the Parties to bear the Cost of New Fittings, and to keep them in Repair.*

1. *Considerations as to the Expense involved in changing from Intermittent to Constant Supply:*

Witness estimates at more than 3,000,000*l.* the cost of providing the apparatus and fittings necessary in changing to the constant system throughott the metropolis, *Muir* 144–156——Estimate of 2*l.* per house as the average cost of altering the fittings for a constant supply throughout the East London district; exclusive of fittings for water-closets, it might perhaps be done for 1*l.* per house, *Greaves* 801–811. 832, 833.

The first cost is less under the constant system than the intermittent system, but the expense of changing to the latter is a great difficulty, *Simpson* 1066, 1067. 1187, 1188. 1263. 1385, 1386. 1412. 1465——Estimate of from 2,500,000*l.* to 3,000,000*l.* as the cost of altering the fittings for a constant service throughout London, *ib.* 1296–1299. 1334, 1335——Further statement as to the less expense of the constant system when it is applied in the first instance and is not an alteration from the intermittent system, *ib.* 1453–1456.

Opinion that the cost of changing from the intermittent to the constant system would be nearer 10*l.* than 8*l.* per house, *Quick* 1523. 1696, 1697——Very large expense in altering both the works and the fittings in connection with a constant service, *ib.* 1694–1700——Estimate of from 7*l.* to 8*l.* per house as the cost of altering the fittings for a constant supply, *Hack* 1724. 1752–1756——Estimate of about 5*l.* per house as the cost of altering the fittings and putting stronger pipes for a constant supply in the district of the Kent Company, *ib.* 1946–1950. 1988–2010——Much less cost in applying the constant system to new houses than in adapting the fittings in old houses, *Letheby* 2384.

Conclusion as to the great exaggeration involved in the estimate of 8*l.* or 10*l.* as the average cost per house of applying the constant system in London, *Bateman* 2504–2509. 2553.——Opinion as to the sufficiency of 1*l.* for introducing a new pipe and tap into the poorer houses in London, whilst 2*l.* would be sufficient if, in addition, a cistern, &c., would be required, *ib.* 2509–2511——Further statement upon the question of cost in applying the constant system as affected by the question of supply to water closets, *ib.* 2636–2668.

Great variation in the cost of altering existing fittings for a constant supply, *Ramsay* 2750——Statement of the expense of pipes and fittings for introducing constant service into new houses; much less cost than in introducing the intermittent system, *Tomlinson* 3124–3130——Small outlay required per house in changing from the intermittent to the constant system, *Rawlinson* 3742–3744.

2. *Question as to the Parties to bear the Cost of New Fittings, and to keep them in Repair:*

Belief as to the inoperativeness of Section 15 of the Act of 1852, unless the landlords or tenants are compelled to pay for new fittings for a constant supply, *Muir* 279–292——Interest of the companies in having good fittings if the constant system is enforced; argument nevertheless that the expense should not fall upon them, *ib.* 286–290. 351–353——Unwillingness of the public to incur the expenses necessary for the application of the constant system, *Hack* 1725–1727.

Dissent from the view that the water companies should be the parties to bear the expense of improved sanitary arrangements in the shape of constant water service, *Letheby* 2338——The expense of the fitting should fall upon the consumers, *Bateman* 2696.

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2. *Question as to the Parties to bear the Cost of new Fittings, &c.*—continued.

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EAST LONDON WATERWORKS COMPANY:

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2. *Various Improvements carried out or contemplated since* 1852.
3. *System of Continuous Supply.*
4. *Details as to the Quality and Quantity of the Supply.*
5. *Particulars set forth in the Registrar General's Reports in* 1866.
6. *Suggestions in Report of Dr. Frankland.*
7. *Various Details supplied in certain Returns furnished by the Company.*
8. *Conclusions of the Committee as to the Quantity and Quality of the present Supply, and as to the Amendments required.*
9. *Evidence relative more especially to the Reservoirs of the Company, and the Works contemplated under the Various Powers Bill and the Thames Supply Bill.*
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5. *Question of Compulsory Powers in order to ensure the required Alterations for a constant Supply.*
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[Third Examination.] Evidence in detail, and cross-examination thereon, with further reference to the present works of the East London Company, and in support of the further works proposed to be carried out under the East London Waterworks (Various Powers) Bill, *App.* 398-414.

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[Fourth Examination.] Further evidence and cross-examination relative to the question of a supply from the Thames, and in support of the East London Water (Thames Supply) Bill, *App.* 439–444.

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H.

Hack, William Boughton. (Analysis of his Evidence.)—Is Engineer to the West Middlesex Water Company, 1701, 1702——Very large expenditure by the company, under the Act of 1852, in removing its source of supply from Barnes to above Hampton, and in constructing filter beds and covered reservoirs, 1703–1711——Authority of the company to take 20,000,000 gallons daily from the Thames, whereas their average supply is only a little more than 8,000,000 gallons, 1712–1715——Supply of upwards of 30 gallons per head per day, 1716——Absence of complaint in the district as to the intermittent system, whilst no requisition has been made for a constant supply, 1717–1723. 1744.

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I.

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KENT WATERWORKS COMPANY:

1. *Sources and Amount of the Company's Supply; Facilities for meeting an increased Demand.*
2. *Quality of the Supply.*
3. *Height at which a Constant Supply might be delivered.*
4. *Defective Provision of Cisterns and Fittings.*
5. *Great Waste during some Experiments with Constant Pressure.*
9. *Arrangements for giving a Constant Supply; Views of the Company on the subject.*
7. *Amount of Capital; Water Rates; Dividend, &c.*
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1. *Sources and Amount of the Company's Supply; Facilities for meeting an increased Demand:*

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Tables submitted by Dr. Frankland to the Registrar General in February 1867, showing the properties of the water supplied by the company in 1865 and 1866, *App.* 325, 326.

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4. *Defective Provision of Cisterns and Fittings:*

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6. *Arrangements for giving a Constant Supply; Views of the Company on the Subject:*

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Statement of the amount of capital of the company in shares and in loans, *App.* 303——Statement of the number and value of houses above and under 20 *l.*, with reference to the question of different rates of charge, *ib.*

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L.

LAMBETH WATERWORKS COMPANY:

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plaint to the Board of Trade, *Simpson* 1130——Explanation as to the smaller supply per house in the Lambeth district than in the Chelsea district, *ib.* 1370–1377——Ample supply given in Lambeth, *ib.* 1378.

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Extent to which cisterns are not supplied with proper ballcocks, &c.; frequent neglect in the matter of fittings, the waste being consequently very great, *App.* 300——Statement of the average quantity of water supplied daily during the year 1866, and also during the years 1856 and 1861, *ib.* 301——Information as to the whole available supply and as to the average of the whole year for the last three years, *ib.*

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Statement of the several rates and charges which the company is empowered to make, with a reference to the section and chapter of the Act conferring such powers, *App.* 301——Statement of the rates and charges actually made by the company, and of all drawbacks, allowances, or special rates for particular purposes, *ib.*

Tabular statement, prepared by Dr. Letheby, showing the general properties of the water supplied by the company in 1867, before and after filtration at the works, *App.* 309——Detailed analysis of the water before and after filtration, *ib.* 310——Table showing the variations in the quality of the water supplied by the company during each of the years 1865 and 1866, *ib.* 311——Comparison of the quality of the water supplied by the company in 1851, 1856, and 1867, showing the amount of solid matter per gallon on the amount of organic and other volatile matters, and the degree of hardness, *ib.* 312.

Return showing the average daily quantity of water supplied by the company in 1866, distinguishing the quantity per house and per head of the population, *App.* 317.

Return of the amount of capital and rate of dividend of the company for the several years 1850, 1860, 1861, 1865, and 1866, *App.* 318.

Tables submitted by Dr. Frankland to the Registrar General in February 1867, showing the properties of the water supplied by the company in 1865 and 1866, *App.* 325, 326.

Lancaster. Reference to Lancaster as an illustration of the successful application of the constant system, *Rawlinson* 3764–3767.

Landlords. Calculation that more than three millions sterling would have to be expended by the landlords in the metropolis in connection with a constant supply, *Muir* 144–156——Great unwillingness of the landlords to bear the expense of new fittings for the constant system, *ib.* 147–151——Very defective supply in many of the poorer class of houses owing to the landlords not providing cisterns, *ib.* 415–423. 432.

Statement as to witness having suggested a certain cistern as an auxiliary supply for the smaller houses in the Southwark district, the landlords however declining to adopt it, *Quick* 1486–1493——Great difficulty in getting landlords to provide or keep in order the fittings required for a constant service, *Letheby* 2298. 2300. 2333–2337.

LEA RIVER:

Arrangement by which the East London Company and the New River Company may divide the water of the River Lea between them, *Greaves* 610–616——Bare sufficiency of the supply from the Lea in 1864, on account of the great drought in that year; consequent application by the East London Company to Parliament in 1866 for a supply from the Thames and for further storage, *ib.* 628–631——Statement with reference to the quality of the water of the Lea below the source of the New River as compared with the water of the latter, *ib.* 952–958.

Examination relative to the supply from the Lea, to the effect that the water of that river is very pure and good, *Simpson* 1131–1159——Denial that the discovery of some eels in the pipes or cisterns supplied by the East London Company is a proof of impurity or want of filtration of the water, *ib.* 1139–1149——Presence of fish in water further adverted to as some proof that the water is pure, *ib.* 1447, 1448.

Tabular statement prepared by Dr. Letheby, showing the general properties of the water supplied by the East London Company, 1867, before and after filteration at the works, *App.* 309——Detailed analysis of the water before and after filteration, *ib.* 310——Table showing the variations in the quality of the water supplied during each of the years 1865 and 1866, *ib.* 311——Comparison of the quality of the water supplied in 1851, 1856, and 1867, showing the amount of sold matter per gallon, and other volatile matter, and the degree of hardness, *ib.* 312.

Return showing the total daily quantity drawn from the River Lea and the wells of the New River Company in 1866, *App.* 317.

Particulars in report of Dr. Frankland to the Registrar General in August 1866, relative to the character of the supply taken from the River Lea by the East London Company, and the amended arrangements required, *App.* 350–353.

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Conclusion as to the wholesome character of the water to be obtained from the river by the East London Company, when the remedial measures recommended by the Committee are carried out, *Rep.* xiii.

See also *Cholera.* *East London Waterworks Company.* *New River Company.* *Reservoirs.*

Lea River Trustees. Petition of the Trustees of the River Lea against the East London Water (Various Powers) Bill, *Rep.* xxv.

Leakage. Leakage and dampness likely to arise from the introduction of constant pressure into the poorer class of houses, *Letheby* 2299, 2300.

Leamington. Statement showing the quality of the water supplied to Leamington, and the rate of mortality with reference to the degree of hardness of the water, *App.* 313.

Leeds. Want of success attending the application of the constant system to Leeds, *Simpson* 1206–1209——Circumstance of there being now a Bill before Parliament for increasing the supply, *ib.* 1208.

Table prepared by Dr. Letheby, showing the quantity of the water supplied to Leeds, and the rate of mortality with reference to the degree of hardness of the water, *App.* 313.

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Recommendation that the Metropolitan Board should be empowered to direct from time to time within what period the constant supply should be introduced into each separate street or district, *Rep.* xxii.

Suggestion that each company be compelled to furnish the Board with an exact copy of

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Experiment made in 1857 in the application of constant pressure to the town of Woolwich for a period of six weeks; immense waste experienced, 1891–1895. 1912——Prior experiment in 1856 in applying the constant system to a block of about twenty houses at Morden Grove, Greenwich, the result showing that 285 gallons per head per day were supplied; state of the fittings and cisterns in these houses, 1896–1915——Wretched state of the fittings in the case of some houses at Woolwich where the cholera was very virulent, 1916–1919——Great waste and great public complaint during the attempted supply of Plumstead on the constant system; general satisfaction given, and great economy of water, by the intermittent system, 1920–1927.

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N.

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2. *Quality of the Supply.*
3. *How far Applications have been made, or measures taken, in connection with a Constant Supply.*
4. *Instance of Great Waste under the Constant System.*
5. *Due Compliance of the Company with the Act of* 1852.
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7. *Rates and Charges of the Company.*
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Average quantity of water distributed daily by the company in each year since 1856; diminution in the last few years through greater care being taken to prevent waste, *Muir* 68–82. 87. 90——In 1866, the average daily supply was nearly 23,000,000 gallons, *ib.* 68——Increase in the number of houses supplied by the company, the average supply per head being now about twenty-nine gallons daily, *ib.* 83–97——The population supplied is about 800,000, the number of houses being 112,964, *ib.* 95–97——Consumption of about twenty-three gallons per head per day; great waste involved, *ib.* 102–111. 458, 459.

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Calculation that an additional 9,000,000 gallons a day may be obtained by the New River Company from the River Lea, by means of storage reservoirs, *Muir*, 129, 130——Necessity of storing the surplus water in flood time, in order to obtain from reservoirs an additional supply of 10,000,000 gallons daily, *ib.* 212–224——Various eligible sites in the

New River Company—continued.

1. *As to the Quantity of Water supplied by the Company, &c.*—continued.

the valley of the Lea for reservoirs, *Muir* 218, 219——Belief that for the next forty or fifty years the New River Company will have no difficulty in meeting the increased demand for water, *ib.* 225——Entire absence of any necessity at present or for many years to come, of storage of water by witness's company, *ib.* 335-338.

Further statement as to the increase of houses in the district supplied by the company, *Muir* 381-387——Detail in further explanation of the facilities for obtaining a largely increased supply from the River Lea, by means of storage reservoirs; reference hereon to the views expressed in the report of the Rivers Pollution Commission, *ib.* 388-407——Capacities of the New River for bringing a largely increased supply from the River Lea to London, *ib.* 408-410——Facilities for enlarging the terminal works of the company, and for constructing additional filter beds, *ib.* 411-413——Appliances of the company at Tottenham for supplementing their supply, *Greaves* 909-912. 980.

Return relative to the sources of supply of water, and the condition of the gathering area, *App.* 255——Statement of the average quantity of water supplied daily during the year 1866, and also during the years 1856, and 1861, *ib.* 259——Information as to the whole available supply, and as to the average of the whole year, for the last three years, *ib.*

Information as to the nature and extent of the natural facilities for storing water, and increasing the supply during the driest season; also as to the character and cost of the works required, *App.* 259——Estimate of the quantity of water supplied respectively for watering the streets, for manufactures, food, and drink, &c., *ib.*——Approximate estimate of the future requirements of water supply for the next fifty years, together with a reference to the means by which the increase may be provided, *ib.*

Return showing the average daily quantity of water supplied by the company in 1866, distinguishing the quantity per house, and per head, of the population, *App.* 317.

2. *Quality of the Supply:*

Comparatively pure source from which the water of witness's company is taken from the Lea, whilst there is a separate channel for the water all the way to London, *Muir* 203-209——Constant and large outlay by the company in acquiring works belonging to other companies, and in purifying, and perfecting the supply generally, *ib.* 228-248.

Tabular statement prepared by Dr. Letheby, showing the general properties of the water supplied by the company in 1867, before and after filtration at the works, *App.* 309——Detailed analysis of the water before and after filtration, *ib.* 310.

Table showing the variations in the quality of the water supplied by the company during each month of the years 1865 and 1866, *App.* 311——Comparison of the quality of the water supplied by the company in 1851, 1856, and 1867, showing the amount of solid matter per gallon, the amount of organic and other volatile matter, and the degree of hardness, *ib.* 312.

Tables submitted by Dr. Frankland to the Registrar General in February 1867, showing the properties of the water supplied by the company in 1865, and 1866, *App.* 325, 326.

3. *How far Applications have been made, or Measures taken, in connection with a Constant Supply:*

Circumstance of no requisition having ever been submitted to the New River Company by the inhabitants, nor any preliminary steps taken with a view to obtaining a constant supply, *Muir* 160-177.

Examination with further reference to the New River Company not having been called upon to give a constant supply to anybody of consumers under the Act of 1852; how far the company has made provision with a view to such supply, *Muir* 249-278. 293-303. 349, 350.

Statement in regard to the arrangements made for constant supply, together with the views of the company as to the best mode of giving effect to clause 15 of the Act of 1852, *App.* 256.

Explanation as to the extent to which applications have been made or measures have been taken under Section 27 of the Act of 1852, with reference to the provision of a constant supply, *App.* 264.

4. *Instance of Great Waste under the Constant System:*

Recent experiment by the company showing that sixteen times the quantity of water was taken under the constant system with the fittings now in use as compared with the intermittent system, *Muir* 138. 453-458.

NEW RIVER COMPANY—continued.

5. *Due Compliance of the Company with the Act of* 1852:

Absence of complaint to the Board of Trade in regard to violation of the provisions of the Act of 1852, by the New River Company, *Muir* 318——Compliance of the company with all the provisions of the Act of 1852, *ib.* 342–344.

6. *Capital or Expenditure of the Company and Rate of Dividend:*

Total of 2,528,767 *l.* hitherto expended by the company, there being power to raise about 500,000 *l.* more, *Muir* 10–15——Return of the dividends of the company in each of the years 1821–66, gradual increase, *ib.* 16–67.

Statement of the amount of capital of the company in shares and in loans, *App.* 254——Abstract of accounts of receipt and expenditure for 1864, 1865, and 1866, together with the dividends and interest paid on capital and loans during the same period, *ib.* 257, 258.

Return of the amount of capital, and rate of dividend of the company for the several years 1850, 1851, 1860, 1861, 1865, and 1866, *App.* 318.

7. *Rates and Charges of the Company:*

Lower average charges of the company than of companies in most provincial towns, *Muir* 200–202——Increase of assessment and of water rates adverted to as the chief cause of the increased dividends of the company in the last few years, *ib.* 433, 434——Explanation of the practice of the company in assessing the water rate with reference to the value of the houses as assessed for other purposes, *ib.* 435–444——Reduced rate at which many of the houses of the poor are supplied, *ib.* 445–447.

Statement of the number and value of houses above and under 20 *l.*, with reference to the question of different rates of charge, *App.* 255——Statement of the several rates and charges which the company is empowered to make, with a reference to the section and chapter of the Act conferring such powers, *ib.* 259, 260——Account of the rates and charges actually made by the company, and of all drawbacks, allowances, or special rates for particular purposes, *ib.* 260–263.

8. *Other Details generally:*

Establishment of the company in the reign of James the Second under Royal Charter, *Muir* 5, 6——Original scheme of the company to bring water to London from the Chadwell Spring, near Ware; artificial channel by which this is done, *ib.* 8. 12——The first Act of Parliament obtained by the company was in 1852, *ib.* 9——Practice to regulate the daily supply for each street until all the cisterns are filled, *ib.* 88–93——Outlay of about 800,000 *l.* under the company's Act of 1852, *ib.* 235——Improved means of preventing waste owing to which the reduced supply by the company is entirely owing; considerable cost incurred in effecting this improvement, *ib.* 328–334.

Particulars as to the district supplied by the company exclusively; also as to the district supplied in conjunction with any other company, *App.* 254——Total number of houses and of inhabitants in the company's district, and total rateable value of the houses, *ib.* 255——Particulars as to the situation, extent, and nature of the company's reservoirs, and filtering beds, and the length and nature of the channels from the source of supply to the place of distribution, *ib.*

Statement of the dimensions of the fire plugs, and the extent of supply of water which may be obtained from each class of mains and fire-plugs in case of fire, *App.* 256——Explanation relative to the situation, nature, and extent of the works and machinery for distribution, *ib.*——Total mileage of streets and roads containing service pipes of the company of different dimensions, *ib.*

Statement showing the extent to which cisterns are not supplied with proper ball-cocks, &c.; frequent neglect in the matter of fittings, the waste being consequently very great, *App.* 258——List of all the local Acts now in force relating to the company, *ib.* 264.

See also *Lea River.* *Spring Water.*

Newcastle. Belief as to the great waste of water under the constant system at Newcastle, *Simpson* 1255.

Statement showing the great waste at one period in Newcastle under the constant system, and the success of measures taken for improving the fittings and cisterns, and reducing the waste, *Bateman* 2520–2526——Great want of privies or watercloset accommodation for the smaller houses in Newcastle, *ib.* 2528–2531.

Very valuable clauses in the Newcastle Waterworks Act empowering the water company to compel the use of proper fittings, &c., *Bateman* 2532–2534——Approval generally of the clauses in the Newcastle Act with respect to a constant supply in London, *ib.* 2603. 2608, 2609.

Newcastle—continued.

Tabular statement prepared by Dr. Letheby showing the quality of the water supplied to Newcastle, and the rate of mortality with reference to the degree of hardness , *A* 313.

North Kent Water Company. See *Kent Water Company.*

Norwich. Statement showing the quality of the water supplied to Norwich, and the rate of mortality with reference to the degree of hardness of the water, *App.* 313.

O.

Odling, Dr. William. (Analysis of his Evidence.)—Was associated with Dr. Letheby and Mr. Abel in making certain examinations of the water supplied by the London companies; concurs substantially in the evidence given by Dr. Letheby as to the quality of the water, 2415–2422.

Owners and Occupiers. Necessity of invoking the aid of some constituted authority in order to ensure that proper fittings, &c., are provided by owners and occupiers, *Rep.* xix–xxii.

Power of the local authorities to compel owners and occupiers to make provision for the supply of water; penalty in the event of their not making proper provision, *Rep.* xx.

Suggested power in occupiers of houses of above 20 *l.* annual value, and not inhabited by more than a single family, to decline to avail themselves of a constant supply, *Rep.* xxii.

P.

Paddington. Petition of the vestry of Paddington against the East London Waterworks (Thames Supply) Bill, *Rep.* xxv.

Paisley. Absence of analogy between London and Paisley as regards the operation of the constant system in the latter place, *Simpson* 1210–1213.

Paris. Preference given to hard water for the supply of Paris, a commission on the subject having reported that it was more wholesome than soft water, *Letheby* 2251–2253. 2274——Information as to the source of supply of the hard water selected for Paris, *ib.* 2253–2260.

Penalties. Facilities for proceeding against the company in the event of the purity or quality of the water not being satisfactory, *Muir* 370–378——Difficulty in obtaining convictions or imposing penalties for waste of water by consumers, *Simpson* 1191——Very peremptory powers contemplated in the water companies in order to protect themselves against undue waste under a constant supply, *Bateman* 2545, 2546. 2552——Expediency of a very summary punishment of offenders for wilful waste under a constant supply, *Bateman* 2608. 2621–2635; *Rawlinson* 3736–3741. 3818–3826.

Liability of the companies to penalties for failing to comply with some of the provisions the Act of 1852, *Rep.* xiv——Provisions in the Act of 1847 for the imposition of penalties upon the consumers and the companies respectively, under certain circumstances, *ib.*

Petitions. List of petitions against the East London Waterworks (Thames Supply) Bill, and the East London Waterworks (various powers) Bill, *Rep.* xxiv, xxv.

Pipes and Mains. Varying number of houses supplied by each service pipe, there being only one cock to turn in order to charge the service and communication pipes, *Greaves* 812–816——Description of the arrangement respectively of the mains, the service pipes, and the communication pipes; service pipes and district mains may be considered as synonymous, *ib.* 812–827——Obligation upon owners to pay for and to repair the communication pipes, *ib.* 856, 857——Limited loss of water from the bursting of communication pipes, *ib.* 858–860.

Stronger pipes required and greater risk of bursting in the case of constant service than of intermittent service, *Simpson* 1095–1099——Greater pressure on the pipes under the constant than the intermittent system, the present pipes not being strong enough under the former system though sufficient under the existing system, *Quick* 1573–1592. 1662–1666.

Practice in provincial towns generally for the water company or the corporation to provide the communication pipes up to the wall of each house, *Bateman* 2458——Sufficiency of a half inch pipe for the supply of large houses under constant pressure, *Pipes and Mains*—continued.

Bateman 2459—— Grounds for concluding that the adoption of constant pressure in London would not necessitate new and stronger communication pipes, *ib.* 2490–2497. 2506–2508——Probable sufficiency of the sum realised by old pipes to provide new ones of less weight, *ib.* 2504, 2505——Question further considered as to the strength of the pipes in London with reference to the pressure under a constant supply, *ib.* 2591–2602.

Statement as to the great shock caused to the pipes when the water is turned on under the intermittent system, *Ramsay* 2743–2745. 2868–2876——Means now adopted for putting on new service-pipes without its being necessary to turn the water off, *ib.* 2854–2856——Doubt as to iron communication pipes being liable to rust very quickly, *Tomlinson* 3191–3199. 3204–3206.

Statement relative to the long period for which witness's firm has supplied large quantities of pipes in London sufficiently strong to bear the alteration from intermittent to constant system, *Easton* 3517–3530. 3594–3599. 3634–3636——Necessity of a rearrangement of many of the mains in London in changing from the intermittent to the constant system, *Rawlinson* 3696–3700.

Proposition for serving small houses by means of separate service pipes communicating with a tank or cistern calculated to hold a sufficient supply for a certain number of such houses, *Rawlinson* 3709–3728——Description of the mode in which the mains might be rearranged so as greatly to improve the pressure and the supply, *ib.* 3794–3799——Large supply of lead pipes in London, by witness's firm, further adverted to, *Easton* 3594–3599. 3634–3636.

Provisions in the Act of 1852, that no communication pipes were to be laid by any person to the company's mains without previous notice to the company, *Rep.* xiv——Obligation upon the companies under the Act of 1847 in regard to laying down communication pipes, *ib.* xv.

New arrangements suggested by the Committee in regard to the laying of communication pipes in connection with a system of constant supply, *Rep.* xx——Suggestion that the existing pipes, and those hereafter laid down, should be kept in repair by the companies, *ib.*

See also *Subways.*

Plumbing Operations. Great difficulty apprehended if all the plumbing operations necessary in applying the constant system were handed over to the water companies, *Letheby* 2386–2391——Arrangements in Manchester as to certain plumbers being licensed and being required to use such fittings as are required by the corporation, *Bateman* 2453. 2465——Advantage of licensed plumbers for altering the fittings for a constant supply, *ib.* 2695——Comment upon the practice of the plumbers in Edinburgh in putting in very defective taps, &c., *Ramsay* 2718. 2720. 2954.

Plumstead. Great waste and great public complaint during the attempted supply of Plumstead on the constant system; general satisfaction given and great economy of water by the intermittent system, *Morris* 1920–1927.

Plymouth. Statement of the quality of the water supplied to Plymouth, and the rate of mortality with reference to the degree of hardness of the water, *App.* 313.

Poorer Classes. See *Dwellings of the Lower Classes.*

Pressure. See *Constant Service.* *Pipes and Mains.*

Preston. Particulars relative to the quality of the water supply of this town, and the rate of mortality with reference thereto, *App.* 313.

Privies. Expedieney of its being compulsory to provide every privy with a flushing apparatus, *Rep.* xviii. xxii.

Provincial Towns. Less liability to waste under the constant system in towns where water-closets are rare than in London, *Muir* 304–310——Necessity of investigation as to the circumstances attending the adoption of constant supply in each town, *Simpson* 1100–1103——Doubt as to there being any town where the constant system has been abandoned for the intermittent, *ib.* 1237–1262——Satisfaction given by the constant system in Norwich, Nottingham, and other towns; much greater difficulty however in adopting the system in London than these places, *Letheby* 2331–2336.

General adoption of the system of constant supply thirty years ago in towns in the North of England, *Bateman* 2434–2437——Supply of only three towns for which witness acts upon the intermittent system, *ib.* 2437, 2438——Several large towns where witness has altered the supply from the intermittent to the constant system, *ib.* 2439.

See also *Mortality.*

Pumps. Table showing the composition of the waters of the pumps and surface wells of the City of London, *App.* 314.

Q.

QUALITY OF WATER:

1. *Details in Explanation of the Character of the Metropolitan Supply generally; good Qualities of the Water, notwithstanding its Hardness.*
2. *Particulars as to the Relative Properties of the Supply of the different Companies.*
3. *Quality of the Water supplied to Provincial Towns.*
4. *Contamination by Means of Cisterns, and when Stored in Tubs, &c.*

1. *Details in Explanation of the Character of the Metropolitan Supply generally; good Qualities of the Water, notwithstanding its Hardness:*

Injurious effect of soft water on leaden pipes, whereas in Thames water there is a small quantity of sulphate of lime which is a protection against the effect of lead, *Simpson* 1002–1025——Preference in Paris for water which is moderately hard as compared with soft water, *ib.* 1017–1019——Limited advantage of constant over intermittent pressure as regards the quality of the water when drawn for consumption, *ib.* 1264–1268. 1305, 1306.

Witness has devoted considerable time and study to making analyses of the water supplied by the different metropolitan companies; supplies sundry particulars in explanation of certain tables and reports on the subject, *Letheby* 2173 *et seq.*——Great reduction made by boiling in the hardness of Thames water, *ib.* 2199, 2200——Large quantity of oxygen in the Thames water, showing that the water is well aërated, *ib.* 2201–2203——Very small proportion of ammonia in the water supplied to London, the rain water used in rural districts containing a much larger quantity, *ib.* 2204-2207.

Result generally of witness's analysis that the waters used in London are in themselves good, and do not contain any excess of carbonate of lime, salts, or other injurious matters, *Letheby* 2209 2223——Statement as to the quantity of carbonate of lime which may be found in water without being detrimental, *ib.* 2210–2219. 2271-2273——Conclusion that the water supplied to London and to most of the large towns in England will bear comparison with that supplied to most towns in Europe, *ib.* 2223——Reference to a certain table as showing the little variation in the composition of the water supplied to London at different seasons of the year, *ib.* 2224–2228——Improvement shown in the quality of the London water between the years 1851 and 1867, *ib.* 2229–2232.

More pleasant taste and appearance of hard water than of soft water, *Letheby* 2249. 2295——Smaller quantity of organic matter in London water than in hard water supplied to other large towns, *ib.* 2250——Advantage of hard water in not having a tendency to absorb foul gases, and in not being liable to putrefaction, *ib.* 2265——Advantage also in its not acting upon lead pipes in the same way that soft water acts, *ib.* 2266.

Further reference to the large reduction in the hardness of the water, when boiled, for washing, *Letheby* 2267, 2268——More wholesome character of waters coming from a chalk and limestone district than from the clay, *ib.* 2313-2315——Considerable variation in the quality of the water taken from the Thames by the same companies on different days, *ib.* 2342, 2343——Examination to the effect that, so far as can be ascertained by chemical analysis, there is nothing really injurious to health in the London water, *ib.* 2349–2380.

Witness was associated with Dr. Letheby and Mr. Abel in making certain examinations of the water supplied by the London companies; concurs substantially in the evidence given by Dr. Letheby as to the quality of the water, *Odling* 2415–2442.

Witness, who is director of the Chemical Department of the War Office, was associated with Dr. Letheby and Dr. Odling in making certain analyses of the water supplied to London, and concurs fully in the evidence given by the former, *Abel* 2423–2429.

Statement in report by Dr. Letheby as to the notable improvement between 1851 and 1866 in the quality of the water supplied to the metropolis, *App.* 315, 316.

Conclusion arrived at by the Government Commission appointed in 1849, that the water then supplied to the metropolis exhibited no unwholesome qualities, *Rep.* vi——Considerable improvement between 1851 and 1856 in the quality of the water taken from the Thames; still further improvement between 1856 and 1866, *ib.* viii——Conclusion that the water taken from the Thames may be advantageously compared with the water generally supplied to towns in England, *ib.*——Reference to the objections urged against the metropolis water on the ground of its hardness; certain counterbalancing advantages urged in favour of the water, *ib.* xiii.

2. *Particulars as to the Relative Properties of the Supply of the different Companies:*

Tabular statement prepared by Dr. Letheby, showing the general properties of the waters supplied by the several companies in 1867, before and after filtration at the works, *App.* 309

QUALITY OF WATER—continued.

2. *Particulars as to the Relative Properties, &c.*—continued.

App. 309——Table showing the analyses of the waters before and after filtration in 1867, *ib.* 310.

Tabular statement showing the variations in the waters of the several companies during each month of the years 1865 and 1866, and the proportion of solid matter, and of organic matter, &c. in each month, *App.* 311.

Comparison of the quality of the water supplied by each company in the years 1851, 1856, and 1867, showing the solid matter per gallon, the organic and other volatile matter, and the degree of hardness, *App.* 312.

Letter from Dr. Frankland to the Registrar General, dated 20 February 1867, enclosing a summary of the results obtained in certain analyses of the metropolitan waters during the years 1866, *App.* 325, 326.

3. *Quality of the Water supplied to Provincial Towns:*

Considerable amount of hardness of the water used in Birmingham, Leamington, Southport, and other towns, the mortality in all such cases being less than in towns supplied with soft water, *Letheby* 2234–2249.

Tabular statement of the quality of the water supplied to various towns in England, showing also the population of each town in 1861, and the mortality per thousand with reference to the degree of hardness of the water, *App.* 313.

4. *Contamination by Means of Cisterns, and when Stored in Tubs, &c.:*

Tendency of the water in cisterns under the intermittent system to become foul, unless proper care be taken, *Muir* 478–482——Great deterioration in the quality of the water in the poorer houses through being stored in tubs, &c., in the absence of cisterns, *Greaves* 598, 599. 713–718——Expediency of cisterns being frequently cleaned out, *ib.* 719–722——Sanitary objection to the supply for domestic use being drawn from the cistern which supplies the water-closets, *Simpson* 1381, 1382. 1387–1389——Advantage of a regular inspection of cisterns, *ib.* 1408–1410.

Deteriorated quality of the water through neglect as regards the state of the cisterns, *Quick* 1671–1673——Question considered as to the liability of the water in cisterns to become foul, more especially where uncovered, *Hack* 1765–1778——Very foul state in which witness has constantly found the cisterns in the poorer class of houses, *Letheby* 2392–2398——Freedom from deposit in the case of closed cisterns supplied through a diminished orifice, *ib.* 2410–2412——Importance of guarding against pollution of cisterns from proximity to the gases evolved from water-closets, *ib.* 2413, 2414.

Certain contamination of water in the poorer houses by the use of cisterns, *Easton* 3481——Great contamination of the water used by the poorer classes, *Rawlinson* 3695.

Conclusion of the Committee as to the great contamination of the water in cisterns; still greater inferiority where the water is stored in tubs, pails, and other receptacles in the poorer class of houses, *Rep.* xvi.

See also *Cholera. Complaints. East London Waterworks Company. Filtration. Kent Waterworks Company. Lea River. New River Company,* 2. *Sewage of Towns. Thames, The.*

QUANTITY OF SUPPLY:

Calculation that for domestic purposes ten gallons per head per day is an ample supply, and that, including all purposes, twenty gallons per head is a very sufficient supply, *Muir* 102–111——Calculation as to the quantity of water per head consumed in the better and poorer class of houses respectively, *Letheby* 2346, 2347——Difficulty in calculating the actual quantity used for drinking and other purposes, *ib.* 2348——Grounds for the conclusion that fifteen gallons per head per day would be a sufficient supply for the better houses in London, *Easton* 3513–3516.

Statement by each company, showing the average quantity of water supplied daily during the year 1866, and also during the years 1856 and 1861, *App.* 259. 269. 275. 282. 289. 295. 301–306.

Information as to the whole available supply of each company, and as to the average of the whole year, for the last three years, *App.* 259. 269. 276. 282. 289. 295. 301. 306.

Comparison of the quantity supplied by each company in 1851, 1856, and 1867, *App.* 312.

Return showing the average daily quantity of water supplied by each company in 1866, distinguishing the quantity per house, and per head of the population, *App.* 317.

Total of about thirty-three million of gallons as the average daily supply obtained by the companies from the Thames in 1856; increase of this amount to forty-seven million gallons in 1866, *Rep.* vii, viii——Data on which it may be assumed that the supply to be required sixty years hence will not exceed 100,000,000 gallons daily; that is from the Thames, *QUANTITY OF SUPPLY*—continued.

Thames, *Rep.*viii——Consideration by the Committee of the average supply per house and per head of the population, *ib.* xvi, xvii.

See also *Lea, River. Reservoirs. Thames, The.*

Quick, Joseph. (Analysis of his Evidence.)—Is engineer to the Southwark and Vauxhall and the Grand Junction Water Companies; has had considerable experience in the construction of waterworks, 1472–1477——Removal of the source of supply of the Southwark and Vauxhall Company to Hampton, under the Act of 1852; 1480, 1481——Sufficiency for the next forty or fifty years, of the existing powers of the company as to the quantity of water to be taken from the Thames, 1482——There has been no formal request made to the company for a constant supply, 1483——Constant supply now practically obtained where the cisternage is good and ample, 1484, 1485.

Statement as to witness having suggested a certain cistern as an auxiliary supply for the smaller houses in the Southwark district, the landlords, however, declining to adopt it, 1486-1493——Readiness evinced by the Southwark and Vauxhall Company to give a Sunday supply, 1494, 1495——Particulars relative to two or three complaints as to the quantity and quality of the water supplied to some houses by the company; satisfaction promptly given in these cases, as shown by Captain Tyler's report, 1496–1502. 1530–1535——There has been no penalty laid on the company, nor any prosecution taken under the Act of 1852; 1503, 1504.

Information as to the source of supply of the Grand Junction Company, and the height to which the water is pumped, 1506–1510——Satisfaction given by the intermittent system in the Grand Junction district, so that there has been no demand for a constant supply, 1511–1513——Supply given on Sunday whenever it is required, 1514——There has been no complaint to the Board of Trade, nor has there been any prosecution against the company under the Act of 1852, or any penalty inflicted, 1515–1517.

Concurrence in the statement of Mr. Simpson as to the flow of water in the Thames being ample for the supply of London for many years to come, 1518. 1617–1619——Increase in the purity and quantity of the water by the operation of the Thames Navigation Act, 1519-1522——Opinion that the cost of changing from the intermittent to the constant system would be nearer 10 *l.* than 8 *l.* per house, 1523. 1696, 1697——Large outlay also necessary in order to substitute hydrants for the present fire-plugs, 1524–1527——Very strict supervision necessary for the prevention of waste under the constant system, 1528, 1529——Varying cost of from 2 *l.* to 5 *l.* for supplying a cistern to every house, as suggested by Captain Tyler, 1536–1544.

Unsatisfactory result of an experiment made by witness in applying the constant system to some houses of his own in St. George's, Southwark, 1545-1553——Preference expressed, under any circumstances, for the intermittent system as compared with the constant system, 1554-1564——Advantage in small houses having a constant supply by means partly of cisterns upon the plan proposed by witness in Southwark, &c.; particulars hereon, 1565-1587.

Greater pressure on the pipes under the constant than the intermittent system, the present pipes not being strong enough to resist the former, though sufficient under the existing system, 1573–1592. 1662–1666——Grounds for concluding that very close supervision would be required under the constant system, 1593–1595——Very few houses in Southwark now supplied from wells or tanks, 1596–1598——Considerable period for which the water of the Southwark and Vauxhall Company has all been taken above Teddington, 1599-1601.

Reference to some representations by the St. Olave's Board of Works in favour of a constant service; objection by the landlords to provide new fittings, so that the complaints were not remedied, 1602–1616——Causes of the much larger supply of water per house in the Grand Junction district than in the Southwark and Vauxhall district, 1620–1623 Supply of above twenty gallons per head per day in Southwark, &c., a vast quantity running to waste, 1624–1626.

Want of proper cisterns in houses of the smaller class in Southwark and Vauxhall, but not in houses of from eight to ten rooms, 1627–1634——Expediency of a proper cistern over the water-closet, or in some convenient place, in every house, no matter how small, 1635–1637. 1667——Objection to a mere pipe and tap for giving a constant supply, 1637——Disapproval of the constant system, regulated by means of a ferrule, 1638–1641——Obstacle, on account of the different levels, to the application of constant service in Southwark, &c., 1641–1652. 1680–1694——Great expense involved in a system of regulating reservoirs in connection with a constant pressure, 1642–1652. 1680–1695.

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1. *Evidence as to the Amount of Waste under the Constant and Intermittent Systems respectively.*
2. *Evidence as to the means of preventing Waste, with reference more especially to Constant Supply.*
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1. *Evidence as to the Amount of Waste under the Constant and Intermittent Systems respectively:*

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Consideration of the question as to the actual amount of waste under the intermittent system, and as to the waste on changing from the intermittent to the constant system, *Rep.* xvii, xviii——Suggestions as to the means of preventing the great waste apprehended by the opponents of the constant system, *ib.* xviii, xix——Statement that in no town in England has a complete and satisfactory system of water supply for all purposes been introduced without unnecessary waste, *ib.* xxiii.

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Water-Closets. Adoption of the constant system in many provincial towns, the liability to waste being, however, much greater in London than in towns where water-closets are rare, *Muir* 304–310——Great waste of water in London in connection with water-closets, *Muir* 414; *Greaves* 861, 862; *Rawlinson* 3695. 3701–3703——Fallacy of the notion that letting the water run waste down water-closets cleanses the drains, *Simpson* 1093, 1094——Means for checking waste under the constant system as well as under the intermittent system in connection with water-closets, *ib.* 1170–1175——Economy of water by the use of self-acting water-closets, *ib.* 1403–1405.

Expediency and facility of the supply to water-closets under the constant system being regulated by a waste-preventer, *Bateman* 2550. 2561–2563. 2661–2663——Statement upon the question of cost in applying the constant system as affected by the question of supply to-water-closets, *ib.* 2636–2663——Apparatus necessary in order to prevent fouling of the water as well as waste, where water-closets are supplied directly from the main, *Rawlinson* 3730–3734.

Return of the number of houses erected or rebuilt since the year 1855 in the several parishes or districts of the metropolis, showing whether every such house has been provided with a water-closet or privy, and how many of each; also, if a water-closet, whether it has been provided with a suitable water supply, and water supply apparatus, &c., *App.* 391–395.

Means of guarding against waste in the event of a constant supply; that is, by a flushing apparatus, *Rep.* xviii——Provisions in the Metropolis Local Management Act of 1855 in regard to new houses or houses rebuilt being furnished with a suitable water-closet and apparatus, *ib.* xx.

See also *Brighton.* *Cisterns.* *Fittings.* *Waste of Water.*

Water Rates. Similar charge made for the water under the constant system, if there be protection against waste, as under the intermittent system, *Morris* 2131.

Abstract of the accounts of the several companies for 1864, 1865, and 1866, showing the amounts received for water rents, &c., *App.* 257, 258. 267, 268. 275. 281. 287, 288. 293, 294. 300. 305.

Statement of the several rates and charges which each company is empowered to make with a reference to the section and chapter of the Act conferring such powers, *App.* 259, 260. 270. 276 277. 283, 284. 289, 290. 296. 301. 307——Statement of the rates and charges actually made by the company, and of all drawbacks, allowances, or special rates for particular purposes, *ib.* 260–263. 270. 277. 284. 290. 297. 301. 307.

Unnecessary charge upon the owners and occupiers of property in the metropolis if any attempt be made to disturb the arrangements under the Act of 1852, as regards supply from the Thames, *Rep.* ix.

Provisions in the Act of 1847 for the settlement of the amount of water rent, and for the payment and recovery thereof, *Rep.* xv——Power of the companies to cut off the supply in the event of the water rate not being paid, *ib.*——Provisions in the special Acts of the companies in regard to the maximum rates to be charged, *ib.*

Reduction provided for by the Act of 1847 in the amount of the water rate, in the event of the dividends or profits exceeding 10 per cent., *Rep.* xv.

See also *Competition.*

Watering the Roads. The watering of the roads in the district of the New River Company has generally been by meter, *Muir* 491.

Estimate by each company of the quantity of water supplied for watering the streets, &c., *App.* 259. 270. 276. 282. 289. 295. 301. 306.——*See* also *St. Pancras.*

Wells. Considerations as to the supply of water obtainable from wells sunk in the chalk formation at different points around London; conclusion that there is much more water in Kent than on the north side of the river, *Morris* 2134–2148. 2172——Absence of necessity for filtering the water derived by the Kent Company from wells, *ib.* 2193–2196.—— *See* also *Kent Waterworks Company.*

WEST MIDDLESEX WATERWORKS COMPANY:

Very large expenditure by the company under the Act of 1852, in removing its source of supply from Barnes to above Hampton, and in constructing filter beds and covered reservoirs, *Hack* 1703–1711——Authority of the company to take 20,000,000 gallons daily from the Thames, whereas their average supply is only a little more than 8,000,000 gallons, *ib.* 1712–1715——Supply of upwards of thirty gallons per head per day, *ib.* 1716.

Absence of complaint in the district as to the intermittent system, whilst no requisition has been made for a constant supply, *Hack* 1717–1723. 1744——Experimental trial of the constant system by witness's company at a high level and a low level; immense waste, especially in the latter case, *ib.* 1731–1734——Circumstance of notice not having been given by witness's company to the persons in whose houses experiment was made with the constant system: state of the fittings adverted to hereon, *ib.* 1779–1788. 1808–1813. 1822, 1823.

Means of the West Middlesex Company for affording a constant supply if the fittings were properly adapted thereto, and if the company's mains were somewhat extended, *Hack* 1789–1796——About equal expense in the first instance of the fittings for the constant system and for the intermittent system, there being however but few new houses built in the West Middlesex district, *ib.* 1797–1801. 1806, 1807——Considerable number of houses supplied with water, otherwise than by the company, *ib.* 1802–1805 Much less supply per head in the district of the West Middlesex Company than of the Chelsea Company, the former company taking every precaution to prevent waste, *ib.* 1823–1834.

Statement of the amount of capital of the company in shares and in loans, *App.* 278 ——Abstract of accounts of receipt and expenditure for 1864, 1865, and 1866, together with the dividends and interest paid on capital and loans during the same period, *ib.* 281 ——Return of the amount of capital and rate of dividend of the company for the several years 1850, 1860, 1861, 1865, and 1866, *ib.* 318.

Particulars as to the district supplied by the Company exclusively; also as to the district supplied in conjunction with any other Company, *App.* 278——Total number of houses and of inhabitants in the Company's district, and total rateable value of the houses, *ib.* 279——Statement of the number and value of houses above and under 20 *l.*, with reference to the question of different rates of charge, *ib.*

Information relative to the sources of supply of water, and the condition of the gathering area, *App.* 279——Particulars as to the situation, extent, and nature of the company's reservoirs, and filtering beds, and the length and nature of the channel from the source of supply to the place of distribution, *ib.* 279——Explanation relative to the situation, nature, and extent of the works and machinery for distribution, *ib.*

Statement in regard to the arrangements made for constant supply, together with the views of the company as to the best mode of giving effect to clause 15 of the Act 1852, *App.* 280—— Explanation as to the extent to which applications have been made, or measures have been taken under section 27 of the Act 1852, with reference to the provision of a constant supply, *ib.* 284.

Total mileage of streets and roads containing service-pipes of the company of different dimensions, *App.* 280——Statement of the dimensions of the fire plugs, and the extent of supply of water which may be obtained from each class of mains and fire plugs in case of fire, *ib.*——Statement showing the extent to which cisterns are not supplied with proper ball-cocks, &c.; frequent neglect in the matter of fittings, the waste being consequently very great, *ib.* 281.

Statement of the average quantity of water supplied daily during the year 1866, and also during the years 1856 and 1861, *App.* 282——Information as to the whole available supply, and as to the average of the whole year for the last three years, *ib.*——Information as to the nature and extent of the natural facilities for storing water and increasing the supply during the driest season; also as to the character and cost of the works required, *ib.*——Estimate of the quantity of water supplied respectively for watering the streets for manufactures, food and drink, &c. *ib.* 282, 283——Approximate estimate of the future requirements of water supply for the next fifty years, together with a reference to the means by which the increase may be provided, *ib.* 283.

Statement of the several rates and charges which the company is empowered to make with reference to the section and chapter of the Act conferring such powers, *App.* 283, 284——Statement of the rates and charges actually made by the company and of all drawbacks, allowances, or special rates for particular purposes, *ib.* 284——List of all the local Acts now in force relating to the company, *ib.*

Tabular

WEST MIDDLESEX WATERWORKS COMPANY—continued.

Tabular statement prepared by Dr. Letheby, showing the general properties of the water supplied by the company in 1867 before and after filtration at the works, *App.* 309 —— Detailed analyses of the water before and after filtration, *ib.* 310——Table showing the variations in the quality of the water supplied by the company or during each month of the years 1865 and 1866, *ib.* 311.

Comparison of the quality of the water supplied by the company in 1851, 1856, and 1867, showing the amount of solid matter per gallon, the amount of organic and other volatile matter, and the degree of hardness, *App.* 312.

Return showing the average daily quantity of water supplied by the company in 1866, distinguishing the quantity per house and per head of the population, *App.* 317.

Tables submitted by Dr. Frankland to the Registrar General in February 1867, showing the properties of the water supplied by the company in 1865 and 1866, *App.* 325, 326.

Wigan. Effectual pressure at Wigan where the constant service works were laid out by witness, *Rawlinson* 3698, 3699——Particulars as to the arrangements at Wigan, where each cottage has an independent constant supply; excellent supervision exercised so that six or seven gallons per head have been found sufficient, *ib.* 3748–3759. 3761–3763. 3768–3770.

Woolwich. Supply by the Kent Waterworks Company of the Government establishments at Woolwich by meter under constant pressure, *Morris* 1885–1887——Experiment made in 1857 in the application of constant pressure to the town of Woolwich for a period of six weeks: immense waste incurred, *ib.* 1891–1895. 1912——Wretched state of the fittings in the case of some houses at Woolwich where the cholera was very virulent, *ib.* 1916–1919——Opinion as to there being considerable waste of water in the Government establishments supplied by meter, *ib.* 1938–1941. 1983–1987——Evidence in further explanation of the circumstances connected with the experimental application of the constant system at Woolwich, &c.; probable causes of the enormous waste, *ib.* 1964–1982. 2011–2013.

Worcester. Tabular statement prepared by Dr. Letheby, showing the quality of the water supplied to Worcester, and the rate of mortality with reference to the degree of hardness of the water, *App.* 313.

Worthing. Steps being taken to give an efficient constant supply at Worthing, *Rawlinson* 3759, 3760.

Y.

York. Statement showing the quality of the water supplied to York, and the rate of mortality with reference to the degree of hardness of the water, *App.* 313.

REPORT

FROM THE

SELECT COMMITTEE

ON THE

FACTORY ACTS EXTENSION

AND

HOURS OF LABOUR REGULATION BILLS;

WITH THE

PROCEEDINGS OF THE COMMITTEE.

Ordered, by The House of Commons, *to be Printed,*
9 *and* 16 *July* 1867.

Thursday, 2nd May 1867.

Ordered, THAT the Factory Acts Extension Bill be committed to a Select Committee.

Ordered, THAT the Hours of Labour Regulation Bill be committed to a Select Committee.

Friday, 10th May 1867.

Ordered, THAT the Select Committee on the Factory Acts Extension Bill and the Hours of Labour Regulation Bill do consist of Seventeen Members.

Committee nominated of—

Lord John Manners.
Mr. Adderley.
Mr. Powell.
Mr. Hartley.
Mr. Austin-Bruce.
Mr. Whitbread.
Mr. Edmund Potter.
Mr. Fawcett.
Mr. Bagnall.
Mr. Wilbraham Egerton.
Mr. Frederick Stanley.
Sir William Stirling-Maxwell.
Mr. Bright.
Mr. Moffatt.
Mr. Akroyd.
Mr. Baxter.
Sir Frederick Heygate.

Ordered, THAT Five be the Quorum of the Committee.

Tuesday, 14th May 1867.

Ordered, THAT the Select Committee on the Factory Acts Extension Bill and the Hours of Labour Regulation Bill do consist of Eighteen Members.

Ordered, THAT Mr. John Benjamin Smith be added to the Committee.

Wednesday, 15th May 1867.

Ordered, THAT the Select Committee on the Factory Acts Extension Bill and the Hours of Labour Regulation Bill do consist of Nineteen Members.

Ordered, THAT Mr. Samuelson be added to the Committee.

Thursday, 16th May 1867.

Ordered, THAT Sir Frederick Heygate be discharged from further attendance on the Committee, and that Mr. Lanyon be added thereto.

Thursday, 23rd May 1867.

Ordered, THAT the Petition of Jacob Weinberg, of Nottingham, for consideration of the case of employers of the Jewish persuasion, be referred to the Select Committee.

Monday, 27th May 1867.

Ordered, THAT Mr. Baxter be discharged from further attendance on the Committee, and that Mr. Dalglish be added thereto.

Thursday, 30th May 1867.

Ordered, THAT the Petition of Messrs. Cassell, Petter & Galpin, praying to be heard before the Select Committee in support of alterations, be referred to the Select Committee on the Bills.

Thursday, 13th June 1867.

Ordered, THAT the following Petitions be referred to the Select Committee on Factory Acts Extension Bill and Hours of Labour Regulation Bill:

From Messrs. Eyre & Spottiswoode.
" Messrs. Spottiswoode & Co.
" J. C. Adlard.
" Messrs. Savill & Edwards.
" R. K. Burt.
" Messrs. Wyman & Sons.
" Messrs. Truscott & Co.
" R. Barrett.

Friday, 14th June 1867.

Ordered, THAT the Petition of Owners and Occupiers of Glass Bottle Works throughout Scotland, praying to be heard by Counsel against the Factory Acts Extension Bill, be referred to the Select Committee on the Bill.

Monday, 17th June 1867.

Ordered, THAT the Petition of a Committee of Needle Manufacturers and other trades at Redditch, for alteration of Factory Acts Extension Bill, be referred to Select Committee on the Bill.

Tuesday, 18th June 1867.

Ordered, THAT the Petition of William Barrows and others, praying to be heard by Counsel against the Factory Acts Extension Bill, be referred to the Select Committee on the Bill.

Ordered, THAT the Petition of Abraham Leon, merchant and manufacturer, of 190, Solly-street, Sheffield, for exemption of Jews from the operation of Articles 3 & 4 of clause 6 in the Hours of Labour Regulation Bill, be referred to the Select Committee on the Bill.

Thursday, 20*th June* 1867.

Ordered, THAT the Petitions of Messrs. Savill & Edwards, Messrs. Spottiswoode & Co., J. E. Adlard and others, Messrs. Eyre & Spottiswoode, and W. H. Collingridge, against the Factory Acts Extension Bill and Hours of Labour Regulation Bill, be referred to the Select Committee on the Bills.

Friday, 21*st June* 1867.

Ordered, THAT the Petitions of Robert Kingston Burt, printer, and Messrs. Wyman & Sons, printers, be referred to the Select Committee on the Factory Acts Extension Bill and Hours of Labour Regulation Bill.

Monday, 24*th June* 1867.

Ordered, That the Petition of F. C. Church and others, in favour of the Factory Acts Extension Bill, be referred to the Select Committee on the Bill.

Ordered, THAT the Petitions of Messrs. Waterlow & Sons and Messrs. Clowes & Sons, for alteration of the Factory Acts Extension Bill and Hours of Labour Regulation Bill, be referred to the Select Committees on the Bills.

Tuesday, 25*th June* 1867.

Ordered, THAT the Petitions of Messrs. Clay, Son & Taylor, printers, against the Factory Acts Extension Bill and Hours of Labour Regulation Bill, be referred to the Select Committee on the said Bills.

Tuesday, 9*th July* 1867.

Ordered, THAT the Committee have leave to make a Special Report.

SPECIAL REPORT

ON THE FACTORY ACTS EXTENSION BILL.

THE SELECT COMMITTEE to whom the FACTORY ACTS EXTENSION BILL was referred;——HAVE agreed to the following SPECIAL REPORT:—

YOUR Committee report that they have not complied with the request of the Petitioners, who ask that the Print Works, Bleaching, and Dyeing Works, should be included in the Factory Acts Extension Bill, inasmuch as no investigation into the operation of the Acts regulating those trades has taken place; but they recommend that a Royal Commission should issue for the purpose of inquiring into and reporting upon the operation of those Acts.

REPORT

ON THE FACTORY ACTS EXTENSION BILL.

THE SELECT COMMITTEE to whom the FACTORY ACTS EXTENSION BILL was referred, have gone through the Bill, and made Amendments thereunto.

REPORT

ON THE HOURS OF LABOUR REGULATION BILL.

THE SELECT COMMITTEE to whom the HOURS OF LABOUR REGULATION BILL was referred, have gone through the Bill, and made Amendments thereunto.

PROCEEDINGS OF THE COMMITTEE.

Monday, 17th June 1867.

MEMBERS PRESENT:

Mr. Hartley.
Mr. Akroyd.
Mr. J. B. Smith.
Lord John Manners.
Mr. Bruce.
Mr. Powell.

Mr. F. Stanley.
Mr. Samuelson.
Mr. Potter.
Mr. W. Egerton.
Mr. Adderley.
Mr. Bright.

Lord JOHN MANNERS was called to the Chair.

The Committee deliberated.

[Adjourned till Friday next, at Twelve o'clock.

Friday, 21st June 1867.

MEMBERS PRESENT:

Lord JOHN MANNERS in the Chair.

Mr. A. Bruce.
Mr. Dalglish.
Mr. F. Stanley.
Mr. J. B. Smith.
Mr. Powell.
Mr. Potter.
Mr. Akroyd.
Sir W. Stirling-Maxwell.
Mr. Samuelson.

Mr. Adderley.
Mr. Bagnall.
Mr. Lanyon.
Mr. Moffatt.
Mr. Fawcett.
Mr. Egerton.
Mr. Hartley.
Mr. Bright.

The Committee deliberated.

FACTORY ACTS EXTENSION BILL.

Preamble of the Bill, *postponed.*

Clauses 1 and 2, *agreed to.*

Clause 3, line 20, amendment proposed, after the word "persons," to insert the words "or after the first of July 1870, 50 or more persons"—(Mr. *Samuelson*).—Question put, That those words be there inserted:—The Committee divided.

Ayes, 5.

Mr. Adderley.
Mr. Akroyd.
Mr. Fawcett.
Mr. Lanyon.
Mr. Samuelson.

Noes, 9.

Mr. Bagnall.
Mr. Bruce.
Mr. W. Egerton.
Mr. Hartley.
Mr. Moffatt.
Mr. Potter.
Mr. Powell.
Mr. Smith.
Mr. F. Stanley.

Amendments made.

Clause 3, as amended, *agreed to.*

Clauses 4, 5, and 6, *agreed to.*

Clause 7, amendment made.—Another amendment proposed, in line 5, after the word "factory" to add the words "subject to the modifications in the Schedule as regards blast furnaces."—(Mr. *Moffatt*).—Question, That those words be there added,—put, and *agreed to.*—Clause, as amended, *agreed to.*

Clause 8, amended, and *agreed to.*

Clauses 9 and 10, *agreed to.*

Clause 11, amended, and *agreed to.*

New Clause (A.) (Inspector or sub-inspector to produce, when required, certificate of appointment) *added.*

Motion made, and Question proposed, That evidence be taken as to the employment of boys as young persons between the ages of 12 and 13—(Mr. *Moffatt*).—Question put, and *negatived.*

[Adjourned till Thursday next, at Twelve o'clock.

Thursday, 27th June 1867.

MEMBERS PRESENT:

Lord JOHN MANNERS in the Chair.

Mr. Dalglish.
Mr. Potter.
Mr. Powell.
Mr. Lanyon.
Mr. Moffatt.
Mr. Egerton.
Mr. Bruce.
Mr. Smith.
Mr. Akroyd.

Mr. Stanley.
Mr. Bagnall.
Mr. Samuelson.
Mr. Bright.
Mr. Fawcett.
Mr. Adderley.
Sir W. Stirling-Maxwell.
Mr. Hartley.

The Committee deliberated.

Motion made, and Question proposed, That evidence be heard in regard to the employment of the labour of women and young persons in the ironworks of South Wales—(Mr. *Moffatt*).—Question put.—The Committee divided:

Ayes, 5.
Mr. Dalglish.
Mr. Lanyon.
Mr. Moffatt.
Mr. Powell.
Mr. Smith.

Noes, 8.
Mr. Akroyd.
Mr. Bagnall.
Mr. Bruce.
Mr. Egerton.
Mr. Fawcett.
Mr. Potter.
Mr. Samuelson.
Mr. Stanley.

Schedule read.

Paragraphs 1 and 2, *agreed to.*

New paragraph (A.), *agreed to.*

Paragraph 3, *agreed to.*

New paragraph (B.), *agreed to.*

New paragraph (C.), *postponed.*

New paragraph (D.)—During the first 30 calendar months next ensuing the 1st day of January 1868, male young persons of not less than 16 years of age may be employed in blast furnaces, in iron mills, in iron foundries, in paper mills, and in any factory where the manufacture of machinery or the processes of letter-press printing or bookbinding are carried on, in the same manner as if they were male persons exceeding the age of 18 years. ——Amendment proposed (in line 2), To leave out the word "male"—(Mr. *Moffatt*).—Question put, That the word "male" stand part of the paragraph.—The Committee divided:

Ayes, 12.	Noes, 5.
Mr. Akroyd.	Mr. Adderley.
Mr. Bagnall.	Mr. Bright.
Mr. Bruce.	Mr. Dalglish.
Mr. Egerton.	Mr. Moffatt.
Mr. Fawcett.	Mr. Smith.
Mr. Hartley.	
Mr. Lanyon.	
Mr. Potter.	
Mr. Powell.	
Mr. Samuelson.	
Mr. Stanley.	
Sir W. Stirling-Maxwell.	

[Adjourned till Wednesday next, at Twelve o'clock.

Wednesday, 3rd *July* 1867.

MEMBERS PRESENT:

Lord JOHN MANNERS in the Chair.

Mr. Akroyd.
Mr. Potter.
Mr. Powell.
Mr. Lanyon.
Mr. Smith.
Mr. Stanley.
Mr. Samuelson.
Mr. Moffatt.
Mr. Hartley.
Sir William Stirling-Maxwell.
Mr. Bruce.
Mr. Dalglish.
Mr. W. Egerton.
Mr. Fawcett.
Mr. Bright.

Schedule further considered.

New paragraphs (D.), (E.), and (F.), *postponed.*

Paragraph 4, amended, and *agreed to.*

Paragraph 5, *disagreed to.*

New paragraph (G.)—Whereas the customs or exigencies of certain trades require that male young persons of the age of 16 years and upwards should be occasionally employed beyond the hours allowed by the Factory Acts, it shall be lawful for one of Her Majesty's Principal Secretaries of State, on due proof to his satisfaction that such customs or exigencies exist, and that such occasional employment is not injurious to the health of such male young persons, from time to time, by order to be advertised in the "London Gazette," or otherwise published in such manner as he may think fit, to give permission that in the case of any particular factory or class of factories, male young persons of 16 years of age and upwards may be employed for a period not exceeding 15 hours on any one day:

Provided that—

1st. They are not so employed, except between the hours of six in the morning and nine in the evening.

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half-an-hour for a meal after the hour of six in the evening.

3rd. They are not so employed for more than 12 days in any period of four weeks, nor on the whole for more than 72 days in any period of 12 months.

Amendment proposed, to leave out the third proviso—(Mr. *Potter*).—Question put, That the proviso proposed to be left out stand part of the paragraph.—The Committee divided:

Ayes, 6.	Noes, 6.
Mr. Akroyd.	Mr. Egerton.
Mr. Bruce.	Mr. Lanyon.
Mr. Fawcett.	Mr. Potter.
Mr. Hartley.	Mr. Samuelson.
Mr. Powell.	Mr. Smith.
Mr. F. Stanley.	Mr. Moffatt.

Thereupon the *Chairman* declared himself with the Ayes.—Paragraph amended, and *agreed to.*

New paragraph (H.)—Whereas the customs or exigencies of certain trades require that the children, young persons, and women working in a factory, or in certain processes in a factory, or that certain sets of such children, young persons, or women, or any of them, should be employed at different hours, and that the limits of time within which they or certain sets of them may be employed should be extended without increasing their legal hours of work: It is hereby delared that on due proof, to the satisfaction of one of Her Majesty's Principal Secretaries of State, of such customs or exigencies existing in a trade, it shall be lawful for the said Secretary, from time to time, by order, to be advertised in the "London Gazette," or otherwise published in such manner as the Secretary of State may think fit, to give permission that in the case of any particular factory or class of factories in which such trade is carried on the occupier may employ the children, young persons, and women working in his factory, or in any processes of his factory, or any sets of such children, young persons, or women, or of any of them, between the hours of seven in the morning and seven in the evening, or between the hours of eight in the morning and eight in the evening, instead of between the hours of six in the morning and six in the evening, for any time in such order specified; and so far as respects the persons referred to in any order given as aforesaid, all the provisions of the Factory Acts affected by such change of hours shall, during the continuance of such order, be read as if the hours of seven in the morning and seven in the evening, or eight in the morning and eight in the evening, as circumstances may require, were throughout such Act substituted for the hours of six in the morning and six in the evening.

Provided—

1st. That notice of the hours between which children, young persons, and women, or each set of them, are to be employed, in such form as the inspectors of factories may direct, and signed by one of such inspectors and the occupier, or his agent, shall be hung up and be kept hung up during the period affected by such notice in such conspicuous place in the factory as may be required by one of the inspectors of factories.

2ndly. Except in pursuance of the provisions contained in other parts of this Act, no child, young person, or woman shall be employed after the hour of two o'clock in the afternoon on Saturday; but it shall be lawful in cases where any children, young persons, or women are employed in accordance with an order given under the foregoing enactment to begin to employ such children, young persons, or women at six o'clock in the morning on Saturday.

Amendment proposed in line 1, after the word "Customs," to insert the words "of certain cities, towns, parishes, or places"—(Mr. *Powell*).—Question put, That those words be there inserted.—The Committee divided:

Ayes, 3.	Noes, 9.
Mr. Moffatt.	Mr. Akroyd.
Mr. Powell.	Mr. Bruce.
Mr. Smith.	Mr. Egerton.
	Mr. Fawcett.
	Mr. Hartley.
	Mr. Lanyon.
	Mr. Potter.
	Mr. Samuelson.
	Mr. Stanley.

Mr. Bruce, in the absence of the Chairman, took the Chair.

Another amendment proposed, in line 17, after the words, "eight in the evening," to insert the words, "or between the hours of nine in the morning and nine in the evening" —(Mr. *Powell*).—Question put, That those words be there inserted.—The Committee divided:

Ayes, 5.	Noes, 5.
Mr. Moffatt.	Mr. Akroyd.
Mr. Potter.	Mr. Egerton.
Mr. Powell.	Mr. Fawcett.
Mr. Smith.	Mr. Hartley.
Mr. Stanley.	Mr. Samuelson.

Whereupon Mr. *Bruce* declared himself with the Noes.

Another amendment proposed, in line 19, after the word "specified," to insert the words "or until further order"—(Mr. *Powell*).—Question, That those words be there inserted—put, and *agreed to.*

[Adjourned till To-morrow, at Twelve o'clock.

Thursday, 4th July 1867.

MEMBERS PRESENT:

Lord JOHN MANNERS in the Chair.

Mr. Samuelson.
Mr. Stanley.
Mr. Powell.
Mr. Potter.
Mr. Lanyon.
Mr. Akroyd.
Mr. Smith.
Mr. Bruce.
Mr. Dalglish.
Mr. Hartley.
Mr. Egerton.
Mr. Moffatt.
Mr. Adderley.
Mr. Fawcett.
Sir W. Stirling-Maxwell.

Schedule further considered.

Paragraph (H.)—Another amendment proposed, in line 19, at the end of the last amendment, to insert the words, " or on any day or days named in such order"—(Mr. *Powell*).—Question put, That those words be there inserted.—The Committee divided:

Ayes, 5.	Noes, 3.
Mr. Lanyon.	Mr. Bruce.
Mr. Potter.	Mr. Akroyd.
Mr. Powell.	Mr. Stanley.
Mr. Samuelson.	
Mr. Smith.	

Paragraph, as amended, *agreed to.*

New paragraph (I.)—Amended, and *agreed to.*

New paragraph (J.)—Young persons of 14 years of age and upwards, and women, may be employed in bookbinding for a period not exceeding 14 hours in any one day.

Provided that—

1st. They shall not be so employed except between the hours of six in the morning and eight in the evening; or where permission has been given by the Secretary of State to work between the hours of seven in the morning and seven in the evening, or of eight in the morning and eight in the evening, then except between the hours of seven in the morning and nine in the evening, or eight in the morning and ten in the evening, as the case may be.

2nd. In addition to the time allowed under the Factory Acts for meals, they shall be allowed half an hour for a meal after the hour of six in the evening.

3rd. They shall not be so employed—

(*a*) If less than 16 years of age, for more than three days in any one month; or,

(*b*) If 16 years of age or upwards, for more than 96 days in any period of 12 months.

Amendment proposed, in line 21 to leave out "96" in order to insert "72"—(Mr. *Akroyd*)—instead thereof.—Question put, That "96" stand part of the paragraph.—The Committee divided:

Ayes, 7.	Noes, 6.
Mr. Dalglish.	Mr. Adderley.
Mr. Hartley.	Mr. Akroyd.
Mr. Moffatt.	Mr. Bruce.
Mr. Potter.	Mr. Egerton.
Mr. Powell.	Mr. Fawcett.
Mr. Smith.	Mr. Samuelson.
Mr. Stanley.	

Another amendment proposed, at the end of the paragraph to add the words, " or for more than five consecutive days in any one week"—(Lord *John Manners*).—Question, That those words be there added,—put, and *agreed to.*

Paragraph, as amended, *agreed to.*

New paragraph (K).—Where, under the modifications contained in the Schedule to this Act, any child, young person, or woman is employed on any day for a longer period than is allowed by the Factory Acts, the day on which and the period during which he or she is so employed shall be entered by the occupier of a factory in a register, which shall be in such form as the inspectors of factories may direct, and shall be deemed to be a register within the meaning of the Factory Acts.—Question put, That this paragraph be added to the Schedule.—The Committee divided:

Ayes, 12.	Noe, 1.
Mr. Adderley.	Mr. Moffatt.
Mr. Akroyd.	
Mr. Bruce.	
Mr. Dalglish.	
Mr. Egerton.	
Mr. Fawcett.	
Mr. Hartley.	
Mr. Potter.	
Mr. Powell.	
Mr. Samuelson.	
Mr. Smith.	
Mr. Stanley.	

Paragraph 6.—Amendment proposed, in line 3, after the words "carried on," to insert the words "shall not apply to iron mills, to paper manufactories, or except as in this Act mentioned, to glass manufactories, or to any factory or process in a factory, to which the said Secretary of State, may by order declare the same to be inapplicable"—(Lord *John Manners*).—Amendment proposed to said proposed amendment, after the words "paper manufactories" to insert the words "any factory in which letter-press printing is carried on"—(Mr. *Powell*).—Question put, That those words be there inserted.—The Committee divided:

Ayes, 8.	Noes, 6.
Mr. Dalglish.	Mr. Adderley.
Mr. Egerton.	Mr. Akroyd.
Mr. Lanyon.	Mr. Bruce.
Mr. Moffatt.	Mr. Fawcett.
Mr. Potter.	Mr. Hartley.
Mr. Powell.	Mr. Samuelson.
Mr. Smith.	
Mr. Stanley.	

Another amendment proposed to the said proposed amendment, at the end of the last amendment, to insert the words "any premises in which bookbinding is carried on"—(Mr. *Moffatt*).—Question put, That those words be there inserted.—The Committee divided:

Ayes, 5.	Noes, 9.
Mr. Dalglish.	Mr. Adderley
Mr. Moffatt.	Mr. Akroyd.
Mr. Potter.	Mr. Bruce.
Mr. Powell.	Mr. Egerton.
Mr. Smith.	Mr. Fawcett.
	Mr. Hartley.
	Mr. Lanyon.
	Mr. Samuelson.
	Mr. Stanley.

Amendment, as amended, *agreed to.*

Another amendment proposed, line 8, after the words "paper manufactories" to insert the words "any factory in which letter-press printing is carried on"—(Mr. *Powell*).—Question put, That those words be there inserted.—The Committee divided:

Ayes, 12.	Noes, 3.
Mr. Adderley.	Mr. Bruce.
Mr. Akroyd.	Mr. Fawcett.
Mr. Dalglish.	Sir W. Stirling-Maxwell.
Mr. Egerton.	
Mr. Hartley.	
Mr. Lanyon.	
Mr. Moffatt.	
Mr. Potter.	
Mr. Powell.	
Mr. Samuelson.	
Mr. Smith.	
Mr. Stanley.	

Paragraph, as amended, *agreed to.*

Paragraph 7.—Amendments made.—Another amendment proposed in line 19, to omit the word "male"—(Mr. *Moffatt*). Question put, That the word "male" stand part of the paragraph.—The Committee divided:

Ayes, 12.	Noe, 1.
Mr. Adderley.	Mr. Moffatt.
Mr. Akroyd.	
Mr. Bruce.	
Mr. Dalglish.	
Mr. Egerton.	
Mr. Hartley.	
Mr. Lanyon.	
Mr. Potter.	
Mr. Samuelson.	
Mr. Smith.	
Mr. Stanley.	
Sir W. Stirling-Maxwell.	

Paragraph, as amended, *agreed to.*

New paragraph (L.), amended, and *agreed to.*

New paragraph (M.)—It shall not be necessary to give notice to the certifying surgeon of any accident to a person employed in any iron mill, unless the accident prevents the person injured from returning to his work for a period of twenty-four hours from the time of the accident.——Amendment proposed, in line 4, to leave out "twenty-four," in order to insert "forty-eight"—(Mr. *Hartley*)—instead thereof. Question, That the word "twenty-four" stand part of the paragraph,—put, and *negatived.*—Forty-eight inserted.—Paragraph, as amended, *agreed to.*

Paragraph 8, amended, and *agreed to.*

New paragraph (N.), amended, and *agreed to.*

New paragraphs (O.) and (P.), *agreed to.*

New paragraph (Q.), *postponed.*

New paragraph (R.), *agreed to.*

New paragraph (Q.), amended, and *agreed to.*

New paragraph (S.), amended, and *agreed to.*

Postponed paragraph (C.), *disagreed to.*

Postponed paragraphs (D.) (E.), *agreed to.*

[Adjourned till Tuesday next, at Twelve o'clock.

Tuesday, 9th July 1867.

MEMBERS PRESENT:

Lord JOHN MANNERS in the Chair.

Mr. Lanyon.
Mr. Potter.
Mr. Samuelson.
Mr. Powell.
Mr. Akroyd.
Mr. J. B. Smith.
Mr. Bruce.

Mr. Egerton.
Mr. Hartley.
Sir W. Stirling-Maxwell.
Mr. Stanley.
Mr. Fawcett.
Mr. Dalglish.

Schedule further considered.

New paragraph (T.) *agreed to.*

New paragraph (V.)—"No factory to which this Act applies shall be so over-crowded while work is carried on as to be dangerous or prejudicial to the health of those employed therein, and so far as relates to any such factory, this Section shall be construed as part of the fourth and fifth Sections of the Factory Acts Extension Act, 1864."—Question put, That this paragraph be added to the Schedule.—The Committee divided:

Ayes, 8.	Noe, 1.
Mr. Akroyd.	Mr. Smith.
Mr. Egerton.	
Mr. Hartley.	
Mr. Lanyon.	
Mr. Potter.	
Mr. Powell.	
Mr. Samuelson.	
Sir W. Stirling-Maxwell.	

Preamble, *agreed to.*

Ordered, to Report the Bill, as amended, to The House.

Special Report, proposed by Mr. *Egerton*—read, and *agreed to,* as follows:

"Your Committee report that they have not complied with the request of the Petitioners who ask that the print works, bleaching, and dyeing works should be included in the Factory Acts Extension Bill, inasmuch as no investigation into the operation of the Acts regulating those trades has taken place, but they recommend that a Royal Commission should issue for the purpose of inquiring into and reporting upon the operation of those Acts."

Ordered, to Report.

HOURS OF LABOUR REGULATION BILL.

Preamble, *postponed.*

Clauses 1 and 2, *agreed to.*

Clause 3.—Amendment proposed, in line 2, to leave out the words "sixty-eight," in order to insert the words "sixty-nine"—(Mr. *Akroyd*)—instead thereof.—Question put, That the words "sixty-eight" stand part of the Clause.—The Committee divided:

Ayes, 5.	Noes, 7.
Mr. Bruce.	Mr. Akroyd.
Mr. Fawcett.	Mr. Egerton.
Mr. Hartley.	Mr. Lanyon.
Mr. Samuelson.	Mr. Potter.
Sir W. Stirling-Maxwell.	Mr. Powell.
	Mr. Smith.
	Mr. Stanley.

Words inserted.—Clause, as amended, *agreed to.*

Clause 4, *postponed.*

Clause 5, *agreed to.*

Clause 6.—Amendment proposed, line 41, to leave out the word "except," in order to insert the words "both before and after one o'clock in the afternoon, nor"—(Lord *John Manners*)—instead thereof.—Question put, That the word "except" stand part of the Clause.—The Committee divided:

Ayes, 3.	Noes, 7.
Mr. Dalglish.	Mr. Akroyd.
Mr. Potter.	Mr. Bruce.
Mr. Powell.	Mr. Fawcett.
	Mr. Lanyon.
	Mr. Samuelson.
	Mr. Stanley.
	Sir W. Stirling-Maxwell.

Question put, That those words be there inserted.—The Committee divided:

Ayes, 6.	Noes, 4.
Mr. Akroyd.	Mr. Potter.
Mr. Bruce.	Mr. Powell.
Mr. Dalglish.	Mr. Samuelson.
Mr. Fawcett.	Sir W. Stirling-Maxwell.
Mr. Lanyon.	
Mr. Stanley.	

Further consideration of the Clause, *postponed.*

Clause 7, *agreed to.*

Clause 8, *postponed.*

Clause 9, amended, and *agreed to.*

Clause 10.—Amendment proposed, line 41, to leave out the words, "in case of a workshop in which less than 20 workmen are employed, of any inspector or sub-inspector of factories"—(Mr. *Samuelson*).—Question put, That the words proposed to be left out stand part of the Clause.—The Committee divided:

Ayes, 2.	Noes, 7.
Mr. Potter.	Mr. Akroyd.
Mr. Powell.	Mr. Bruce.
	Mr. Fawcett.
	Mr. Hartley.
	Mr. Lanyon.
	Mr. Samuelson.
	Mr. Stanley.

Clause amended, and *agreed to.*

Clause 11, amended, and *agreed to.*

Clauses 12, 13, 14, and 15, *agreed to.*

[Adjourned to Friday next, at Twelve o'clock.

Tuesday, 18th July 1867.

MEMBERS PRESENT:

Lord JOHN MANNERS in the Chair.

Mr. Powell.
Mr. Potter.
Mr. Akroyd.
Mr. Samuelson.
Mr. Bruce.
Mr. Adderley.
Sir William Stirling-Maxwell.
Mr. Hartley.
Mr. Fawcett.

Postponed Clause 4.—Amendment made.—Clause, as amended, *agreed to.*

Postponed Clause 6.—Amendment proposed, in line 12, after the words "on Sunday," to leave out the words "or after Two o'clock on Saturday afternoon"—(Mr. *Potter*).—Question put, That the words proposed to be left out stand part of the Clause.—The Committee divided:

Ayes, 4.	Noes, 4.
Mr. Adderley.	Mr. Hartley.
Mr. Akroyd.	Mr. Potter.
Mr. Bruce.	Mr. Powell.
Sir W. Stirling-Maxwell.	Mr. Samuelson.

Whereupon, the Chairman declared himself with the Ayes.

Amendments made.

Clause, as amended, *agreed to.*

Postponed Clause 8, *disagreed to.*

New Clause (Liability of hirer of machine instead of occupier) *added* to the Bill.

New Clause (Regulations for attendance at school of children employed in workshops):

"The following regulations shall be made (subject to the provisions hereinafter mentioned) respecting the education of children employed in workshops:—

"(1.) Every child who is employed in a workshop, shall attend school for at least seven hours and a half in every week during the whole of which he is so employed.

"(2.) In computing for the purpose of this section, the time during which a child has attended school, there shall not be included any time during which such child has attended either—

"(*a.*) In excess of three hours on any one day, or,

"(*b.*) On Sundays, or,

"(*c.*) Before eight o'clock in the morning, or after nine o'clock in the evening.

Provided, that the non-attendance of any child at school shall be excused—

"(1.) For any time during which he is certified by the principal teacher of the school to have been prevented from attendance by sickness or other unavoidable cause.

"(2.) For any time during which the school is closed for the customary holidays, or for some other temporary cause.

"(3.) For any time during which there is no school which the child can attend within one mile (measured according to the nearest road) from the residence of such child.

Amendment, proposed in line 5, to leave out the word "seven," in order to insert the word "ten"—(Mr. *Bruce*)—instead thereof.—Question put, That the word "seven" stand part of the Clause.—The Committee divided:

Aye, 1.	Noes, 8.
Mr. Adderley.	Mr. Akroyd.
	Mr. Bruce.
	Mr. Fawcett.
	Mr. Hartley.
	Mr. Potter.
	Mr. Powell.
	Mr. Samuelson.
	Sir W. Stirling-Maxwell.

Word inserted.

Clause amended, and *agreed to.*

New Clauses added to the Bill.

New Clause :—

"The principal teacher of a school, which is attended by any child employed in a workshop, may apply in writing to the occupier of such workshop to pay such sum as hereinafter mentioned, and after the date of such application, the occupier, so long as he employs the child, shall pay to the principal teacher of the said school for every week that the child attends that school, the weekly sum specified in the application, not exceeding 2 *d.* per week, and not exceeding one-twelfth part of the wages of the child. The occupier may deduct the sum so paid by him from the wages payable for the services of such child.

On application of teacher occupier to pay sum for schooling of child, and deduct it from wages.

"Any occupier who, after such application, refuses to pay any sum that may become due as aforesaid, shall be liable to a penalty not exceeding 10 *s.*

"If an inspector of factories is satisfied by inspection of a school or otherwise, that the principal teacher of a school, who grants certificates of school attendance required under this Act, ought to be disqualified for granting such certificates for any of the following reasons, namely:

Inspector may disqualify for granting certificates any teacher who is unfit

"1. Because he is unfit to instruct children, by reason either of his ignorance or neglect, or of his not having the necessary books and materials.

"2. Because of his immoral conduct.

"3. Because of his continued neglect to fill up proper certificates of school attendance—

in any such case he may serve on the teacher a written notice, stating the reason for such disqualification. At the expiration of two weeks, from the date of such notice, the teacher shall, subject to the appeal hereinafter mentioned, be disqualified for granting certificates.

"The Inspector shall, so far as he can, serve on every occupier of a workshop who obtains certificates from such teacher a notice to the like effect as the notice served on the teacher, and also specifying a school which the child employed in the workshop of such occupier can attend within one mile (measured according to the nearest road) from the residence of the child.

"Any teacher who is disqualified as aforesaid, and any occupier of a workshop who obtains certificates from him may, within three weeks after the service of the notice on the teacher, appeal therefrom to one of Her Majesty's principal Secretaries of State, who may confirm or reverse such disqualification.

"After a teacher is disqualified for granting certificates, no certificate given by him shall be deemed to be a certificate in compliance with this Act, unless in the case of there being no other school which the child employed in a workshop can attend within one mile (measured according to the nearest road) from the residence of such child, or unless with the written consent of an Inspector of Factories.

"The Inspectors of Factories shall in their Reports to one of Her Majesty's Principal Secretaries of State report the name of every teacher disqualified under this section during the preceding six months, the name of the school at which he taught, and the reason for the disqualification.

"Every person who forges or counterfeits any certificate required by this Act, or gives or signs any such certificate falsely, or wilfully makes use of any forged, counterfeited, or

Penalty for forging, &c. certificate.

false certificates, or aids in or connives at any of the foregoing offences, shall be guilty of a misdemeanor, and be liable to be imprisoned for any period not exceeding three months, with or without hard labour."

Amendment made.—Another amendment proposed, in line 32, after the word "teacher," to leave out the words "and also specifying a school which the child employed in the workshop of such occupier can attend within one mile (measured according to the nearest road) from the residence of the child"—(Mr. *Powell*).—Question put, That the words proposed to be left out stand part of the Clause.—The Committee divided:

Ayes, 4.	Noes, 3.
Mr. Acroyd.	Mr. Hartley.
Mr. Bruce.	Mr. Potter.
Mr. Fawcett.	Mr. Powell.
Mr. Samuelson.	

Clause, as amended, *added* to the Bill.

Schedule considered, amended, and *agreed to.*

New Schedules *added* to the Bill.

Preamble, *agreed to.*

Ordered, To Report the Bill, as amended, to The House.

REPORT

FROM THE

SELECT COMMITTEE

ON THE

FACTORY ACTS EXTENSION

AND

HOURS OF LABOUR REGULATION BILLS;

WITH THE

PROCEEDINGS OF THE COMMITTEE.

Ordered, by The House of Commons, *to be Printed,*
9 *and* 16 *July* 1867.

429.

Under 2 *oz.*

REPORT

FROM THE

SELECT COMMITTEE

ON

LIBEL BILL;

WITH THE

PROCEEDINGS OF THE COMMITTEE.

Ordered, by The House of Commons, *to be Printed,*
8 *April* 1867.

Wednesday, 13*th March* 1867.

Libel Bill, read a second time, and committed to a Select Committee.

Wednesday, 20*th March* 1867.

Select Committee nominated—

Mr. Secretary Walpole.	Mr. Lawson.
Mr. Solicitor General.	Mr. Roebuck.
Mr. Milner Gibson.	Mr. Sandford.
Sir Robert Collier.	Captain Gridley.
Viscount Amberley.	Mr. Sullivan.
Mr. Henley.	Mr. Baines.
Mr. Lowe.	Sir Colman O'Loghlen.

Ordered, That Five be the Quorum of the Committee.

Monday, 25*th March* 1867.

Ordered, That Mr. Goldsmid be added to the Committee.

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REPORT.

THE SELECT COMMITTEE to whom the LIBEL BILL was referred;——

HAVE gone through the Bill, and made Amendments thereunto, and have amended the Title as followeth:—

A BILL to amend the LAW of LIBEL.

8th April 1867.

PROCEEDINGS OF THE COMMITTEE.

Monday, 25th March 1867.

MEMBERS PRESENT:

Mr. Henley.
Sir Colman O'Loghlen.
Mr. Baines.
Mr. Lawson.
Captain Gridley.
Mr. Sullivan.
Sir Robert Collier.
Viscount Amberley.

Sir *Colman O'Loghlen* was called to the Chair.

The Committee deliberated.

[Adjourned to Thursday next, at One o'clock.

Thursday, 28th March 1867.

MEMBERS PRESENT:

SIR COLMAN O'LOGHLEN, in the Chair.

Mr. Henley.
Captain Gridley.
Mr. Goldsmid.
Mr. Lawson.
Mr. Sullivan.
Mr. Baines.
Lord Amberley.
Mr. Solicitor General.
Mr. Lowe.
Mr. Milner Gibson.
Mr. Sandford.
Sir Robert Collier.

The Committee deliberated.

[Adjourned to Thursday next, at One o'clock.

Thursday, 4th April 1867.

MEMBERS PRESENT:

SIR COLMAN O'LOGHLEN, in the Chair.

Mr. Henley.
Captain Gridley.
Mr. Lawson.
Mr. Baines.
Lord Amberley.
Mr. Solicitor General.
Mr. Goldsmid.
Mr. Lowe.
Sir Robert Collier.
Mr. Sullivan.
Mr. Sandford.
Mr. Roebuck.

The Committee deliberated.

Preamble of the Bill postponed.

Clauses 1 and 2, *disagreed to.*

Clause 3, amended, and *agreed to.*

Clause 4, *agreed to.*

Clauses 5, 6, and 7, *disagreed to.*

Clause 8, *postponed.*

Clause 9, *disagreed to.*

Clause 10, *postponed.*

Clauses 11 and 12, *agreed to.*

MS. Clause A., read a first and second time, as follows:—"In any action or prosecution for an alleged libel in any public newspaper, proof that the alleged libel was a true and fair report of the proceedings at a meeting lawfully assembled for a lawful purpose, and at which reporters for the press were present, and that the report was published in the newspaper *bonâ fide* without actual malice and in the ordinary course of business, shall amount to a defence, and such proof may in all cases be given by the defendant under the general plea of not guilty"—(The *Chairman*).—Amendment proposed in line 3, after the word "meeting," to insert the words, "of a public character"—(Mr. *Sullivan*).—Question, That those words be there inserted, put, and *negatived.*

Amendments made.—Question, That the clause, as amended, be added to the Bill, put, and *agreed to.*

MS. Clause B., read a first time, as follows:—"In case the defendant in any action or prosecution for an alleged libel shall rely on the defence in the last section mentioned, it shall be lawful for the plaintiff to prove that the defendant declined, or omitted, when required so to do, to publish in his said newspaper, and in a mode as conspicuous as that in which the said libel was published, an explanation or contradiction of the alleged libel, of not unreasonable length, immediately after such explanation or contradiction was furnished to the defendant by or on behalf of the plaintiff, and such evidence shall be admissible to prove that such report was not *bonâ fide* published by the defendant, unless such explanation or contradiction shall have contained libellous matter reflecting on the character of some other person, and the defendant shall have declined to publish such explanation or contradiction on that ground, or until such libellous matter shall have been expunged"—(The *Chairman*).—Question, That this clause be now read a second time, put, and *negatived.*

MS. Clause C., read a first time, as follows:—"Provided always, that such defence shall not be valid if it shall be proved that the defendant declined, or omitted, when required so to do, to publish in the said newspaper, and in a mode as conspicuous as that in which the said alleged libel was published, an explanation or contradiction of the alleged libel, of not unreasonable length, immediately after such contradiction or explanation shall have been furnished to the said defendant by or on behalf of the plaintiff or prosecutor, but the defendant shall not be bound to publish such explanation or contradiction if it contains libellous matter"—(The *Chairman*).—Question, That this clause be now read a second time.—The Committee divided:

Ayes, 8.	Noes, 4.
Lord Amberley.	Sir Robert Collier.
Mr. Baines.	Mr. Goldsmid.
Captain Gridley.	Mr. Lawson.
Mr. Henley.	Mr. Lowe.
Mr. Roebuck.	
Mr. Sandford.	
Mr. Solicitor General.	
Mr. Sullivan.	

Amendments made.

Another Amendment proposed in line 3, to leave out the words, "and in a mode as conspicuous"—(Sir *R. Collier*).—Question, That the words proposed to be left out stand part of the clause, put, and *agreed to.*

Another amendment proposed in line 5, to leave out the words, "of not unreasonable length"—(Mr. *Goldsmid*).—Question, That the words proposed to be left out stand part of the clause, put, and *agreed to.*

Another amendment proposed at the end of the clause, to add the words, "unless and until such libellous matter be expunged upon notice in writing thereof being given to such plaintiff or prosecutor by the defendant"—(Mr. *Roebuck*).—Question, That those words be there added, put, and *agreed to.*

Question, That the Clause, as amended, be added to the Bill, put, and *agreed to.*

MS. Clause D., read a first time, as follows:—"Any person who shall, at a meeting lawfully assembled for a lawful purpose, and at which reporters for the press shall be present, maliciously speak any defamatory matter, injurious to the good fame or reputation of any other person, knowing the same to be false, shall be liable, if the proceedings of said meeting shall be reported in a public newspaper, to be proceeded against by indictment, information, or action, in the same manner and to the same extent as if he had written and published the same; and on such indictment or information, or in such action, the proceedings shall be in all respects the same as if the defamatory matter complained of had been written and published by the defendant"—(The *Chairman*).—Question put, That this Clause be now read a second time.—The Committee divided.

Ayes, 3.	Noes, 9.
Lord Amberley.	Mr. Baines.
Mr. Goldsmid.	Sir Robert Collier.
Captain Gridley.	Mr. Henley.
	Mr. Lawson.
	Mr. Lowe.
	Mr. Roebuck.
	Mr. Sandford.
	Mr. Solicitor General.
	Mr. Sullivan.

MS. Clause E., read a first and second time, as follows:—"In all actions for libel, where the jury shall give damages under five pounds, the plaintiff shall not be entitled to more costs than damages, unless the judge before whom such verdict shall be obtained shall immediately afterwards, and in open Court, certify on the back of the record that the libel was wilful and malicious"—(The *Chairman*).—Amendment proposed, in line 2, to leave out the words "five pounds," in order to insert the words "forty shillings"—(Mr. *Goldsmid*)—instead thereof.—Question, That the words proposed to be left out stand part of the Clause, put, and *negatived.*

Words inserted.—Other Amendments made.—Question, That the Clause, as amended, be added to the Bill, put, and *agreed to.*

MS. Clause F., read a first and second time, as follows:—"It shall not be lawful for a private prosecutor to prefer an indictment for the publication of a defamatory libel against any person who shall not have been, previously to said indictment being preferred, bound by recognizance or committed to custody to answer the charge stated in said indictment; and no person shall be bound by recognizance or committed to custody to answer any indictment for a libel at the suit of a private prosecutor by any justice or justices of the peace, unless such prosecutor shall enter into a recognizance before him or them, and which recognizance the said justice or justices is and are hereby empowered to take, with two solvent sureties in the sum of 50*l.*, that he will effectually prosecute such indictment if it shall be thereafter found by the grand jury before whom it may be preferred"—(The *Chairman*).—Amendments made.—Question, That the Clause, as amended, be added to the Bill, put, and *agreed to.*

MS. Clause G., read a first and second time, as follows:—"In case any person against whom such indictment shall be found shall appear and plead to the same, and the prosecutor of such indictment shall not within one whole year next after plea pleaded, or within such further time as may be granted by any judge before whom the case may come on for trial, procure the same to be tried, or if upon such trial the defendant shall be acquitted, or in case the prosecutor shall procure a *nolle prosequi* to be entered on such indictment, then in any of such cases the defendant shall be discharged from all further proceedings in respect of the alleged libel charged in such indictment, and shall be entitled to receive from such prosecutor the costs sustained by him by reason of said indictment, unless the judge before whom the indictment shall be tried shall, immediately after the verdict thereon, and in open court, certify on the back of the record that the prosecutor had reasonable cause for preferring such indictment; and for the recovery of his costs the defendant shall be entitled to the benefit of the recognizance entered into as aforesaid by the prosecutor, and shall have all the remedies that may be necessary to enforce the same"—(The *Chairman*).—Amendments made.—Question, That the Clause, as amended, be added to the Bill, put, and *agreed to.*

MS. Clause H.: "Nothing in the last two sections contained shall apply to an indictment by a private prosecutor for the publication of any defamatory libel published with intent to extort any money or security for money or any valuable thing from such private prosecutor or any other person, or with intent to induce such private prosecutor or any other person to confer or procure for any person any appointment or office of profit or trust"—(The *Chairman*).—Read a first and second time, and *added to the Bill.*

MS. Clause I.: "In all cases, civil or criminal, where a defendant is or shall be allowed to plead the truth of the matters charged in the defamatory libel as a justification or defence, or part of a defence, it shall be sufficient for the defendant to plead that the said alleged libel is true in substance and matter of fact, either alone or with such other averments as is now or may hereafter be by law required to be added to constitute a defence to any proceedings, civil or criminal, and to this plea the plaintiff or prosecutor shall be at liberty to reply generally"—(The *Chairman*).—Read a first and second time, and *added to the Bill.*

MS. Clause K.: "The words 'public newspaper' in this Act shall be construed to mean any newspaper duly registered at the Stamp Office in Westminster or Dublin, and none other"—(The *Chairman*).—Read a first and second time, and *added to the Bill.*

Postponed Clause 10, *agreed to.*

[Adjourned to Monday next, at One o'clock.

Monday 8*th April* 1867.

MEMBERS PRESENT:

SIR COLMAN O'LOGHLEN, in the Chair.

Mr. Milner Gibson.	Mr. Goldsmid.
Mr. Lawson.	Mr. Solicitor General.
Lord Amberley.	Captain Gridley.

Postponed clause 8, amended, and *agreed to.*

M.S. Clause L., read a first time as follows:—"If any person shall at any such meeting as aforesaid speak any defamatory matter reflecting upon the character or circumstances of another, which shall afterwards be published in any public newspaper, and which, if written and published, would amount to a libel, and such person shall, upon application in writing made to him by the person defamed, refuse or neglect forthwith to publish a full apology for having so spoken such defamatory matter, in some public newspaper, circulating in the part of the country in which such meeting shall have been held, it shall be lawful for the person defamed to proceed by action for libel against the person who shall have so spoken such defamatory matter, and in such action the proceedings shall be in all respects the same as if such defamatory matter had been written and published by the person who shall have so spoken the same:—(Mr. *Solicitor General*).—Question put, That the Clause be now read a second time.—The Committee divided.

Ayes, 5.	Noe, 1.
Lord Amberley.	Mr. Lawson.
Mr. Milner Gibson.	
Mr. Goldsmith.	
Captain Gridley.	
Mr. Solicitor General.	

Amendment proposed in line 3, to leave out the words, "which shall afterwards be published in any public newspaper, and which, if written and published, would amount to a libel"—(Captain *Gridley*).—Question, That the words proposed to be left out stand part of the clause, put, and *agreed to.*

Question, That the Clause, as amended, be added to the Bill, put, and *agreed to.*

MS. Clause M.:—"Nothing herein contained shall affect any action or prosecution, which shall have been commenced before, and shall be actually pending at the time of the passing of this Act"—(The *Chairman*), read a first and second time, and *added to the Bill.*

Preamble amended, and *agreed to.*

Title, amended.

Ordered, To Report the Bill, as amended to The House.

REPORT

FROM THE

SELECT COMMITTEE

ON

LIBEL BILL;

WITH THE

PROCEEDINGS OF THE COMMITTEE.

Ordered, by The House of Commons, *to be Printed,*
8 *April* 1867.

208.

Under 1 *oz.*

REPORT

FROM THE

SELECT COMMITTEE

ON

SPECIAL AND COMMON JURIES;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

Ordered, by The House of Commons, *to be Printed,*
8 *July* 1867.

425.

Tuesday, 4th June 1867.

Ordered, THAT a Select Committee be appointed to inquire and take evidence as to the law and practice relating to the summoning, attendance, and remuneration of Special and Common Juries, and to report to this House as to any alterations which ought to be made therein.

Friday, 7th June 1867.

Committee nominated of,—

Viscount Enfield.
Mr. Brett.
Mr. Denman.
Mr. Huddleston.
Mr. Whatman.
Colonel William Stuart.
Mr. Alderman Salomons.
Mr. Freshfield.
Mr. Hastings Russell.
Mr. Turner.
Mr. Alderman Lusk.
Mr. Charles Wynn.
Mr. Headlam.

Ordered, THAT the Committee have power to send for Persons, Papers, and Records.

Ordered, THAT Five be the Quorum of the Committee.

Monday, 8th July 1867.

Ordered, THAT the Committee have Power to report their Observations, together with the Minutes of Evidence taken before them, to the House.

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REPORT.

THE SELECT COMMITTEE appointed to inquire and take Evidence as to the LAW and PRACTICE relating to the summoning, attendance, and remuneration of SPECIAL and COMMON JURIES;——HAVE considered the Matters to them referred, and have agreed to the following REPORT:

THAT in consequence of the late period of the Session, your Committee have been unable to complete their inquiry into the matters referred to them, and they have accordingly agreed to report the Evidence taken before them, and to recommend to the House the re-appointment of the Committee in the next Session of Parliament.

PROCEEDINGS OF THE COMMITTEE.

Monday, 17th June 1867.

MEMBERS PRESENT:

Viscount Enfield.
Mr. Wynn.
Mr. Huddleston.
Mr. Headlam.
Mr. Brett.
Colonel William Stuart.
Mr. Whatman.
Mr. Alderman Salomons.
Mr. Denman.
Mr. Turner.
Mr. Alderman Lusk.

Viscount Enfield was called to the Chair.

The Committee deliberated.

[Adjourned till Monday next, at Twelve o'clock.

Monday, 24th June 1867.

MEMBERS PRESENT:

Viscount Enfield in the Chair.

Mr. Headlam.
Mr. Whatman.
Mr. Turner.
Mr. Huddleston.
Mr. Freshfield.
Mr. Wynn.
Mr. Brett.
Mr. Alderman Lusk.
Mr. Denman.
Colonel William Stuart.
Mr. Alderman Salomons.

Mr. *T. William Erle* and Mr. Serjeant *Pulling* were severally examined.

[Adjourned till Monday next, at One o'clock.

Monday, 1st July 1867.

MEMBERS PRESENT:

Viscount Enfield in the Chair.

Mr. Wynn.
Mr. Huddleston.
Mr. Whatman.
Mr. Turner.
Mr. Freshfield.
Mr. Alderman Lusk.
Mr. Alderman Salomons.
Mr. Headlam.
Mr. Hastings Russell.

Mr. *William Burchell* and Mr. *George William Gillet Potter* were severally examined.

[Adjourned till Monday next, at One o'clock.

Monday, 8*th July* 1867.

MEMBERS PRESENT:

Viscount ENFIELD in the Chair.

Mr. Turner.
Mr. Denman.
Mr. Wynn.
Mr. Headlam.
Colonel Stuart.
Mr. Freshfield.
Mr. Alderman Lusk.
Mr. Whatman.
Mr. Alderman Salomons.

Mr. *Charles James Abbott* examined.

Mr. *George Potter* further examined.

Mr. *Henry Pollock* examined.

The Committee deliberated.

Report proposed by the Chairman, read the first time, as follows:

"That in consequence of the late period of the Session, your Committee have been unable to complete their inquiry into the matters referred to them, and they have accordingly agreed to report the Evidence taken before them, and to recommend to the House the re-appointment of the Committee in the next Session of Parliament."

Report read a second time, and *agreed to.*

Ordered, To Report, together with the Minutes of Evidence and Appendix.

LIST OF WITNESSES.

Monday, 24*th June* 1867.

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William Burchell, Esq. - - - - - - - - - - p. 24
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Charles James Abbott, Esq. - - - - - - - - - p. 43
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MINUTES OF EVIDENCE.

Monday, 24*th June* 1867.

MEMBERS PRESENT:

Mr. Alderman Lusk.
Mr. Alderman Salomons.
Mr. Brett.
Mr. Denman.
Viscount Enfield.
Mr. Freshfield.
Mr. Headlam.
Mr. Huddleston.
Colonel William Stuart.
Mr. Turner.
Mr. Whatman.
Mr. Charles Wynn.

VISCOUNT ENFIELD, IN THE CHAIR.

T. WILLIAM ERLE, Esq., called in; and Examined.

T. W. E
Esq.
24 Jun
1867.

1. *Chairman.*] YOU are an Associate of the Court of Common Pleas?—I am.

2. Will you kindly explain, for my benefit, as I am not a lawyer, what the duties of that office are?—The duties are very indefinite; they have grown up by practice, and are not strictly defined in any Act of Parliament; but I may state them generally to consist in the management of all the mechanical arrangements, so to speak, with reference to the business of the court at nisi prius, settling how the causes are to come on, taking the verdicts, and answering all questions of persons interested in the causes.

3. During those duties you have had your attention, I believe, very much directed to the system on which juries are summoned, and their attendance and their remuneration?—Yes.

4. This Committee has been appointed to inquire into those particular points, and we should be very much obliged if you would direct your evidence to each of those points. First, with reference to the summoning of juries, will you tell us whether you think that the practice is a good one; and if it is not a good one, in what way it should be remedied?—I had better, perhaps, speak first with reference to special juries, and with regard to Middlesex.

5. Will you state how they are summoned in Middlesex?—The under-sheriff would give more authoritative information upon that point; but I can state it in a general way very shortly. The names of the persons liable to serve as jurors are supplied by the overseers and churchwardens in Middlesex, and entered in a book called the jurors' book (I am merely giving an outline, and not all the details, which would be better got from the under-sheriff), and in the jurors' book every person who comes up to a certain qualification as banker, or esquire, or of a higher degree, is marked as a special juror.

6. Mr. *Whatman.*] Is that done by the magistrates as it is in the country, or by some special officers in London?—I scarcely know how it is fixed, but practically any juror can get himself placed upon the list of common or special jurors as he likes, and I think it is a great abuse that that should be so.

7. But are you yourself aware of the process; the way in which it is done?—I know that that is the way in which it is done; the people possessing those qualifications are put on the special jury list. But that is a matter entirely for the under-sheriff to speak to.

8. Mr. *Headlam.*] Practically, as far as you know, a gentleman can get his name placed either upon the special or upon the common jury list by making some statement?—Yes.

9. He can himself affect the question of the list upon which he is to be placed?—Yes, he can. If he supplies his name to the overseer as "gentleman," for instance, something below the degree of "esquire," he is put upon the common juror's list, and he is entered in the book then as "gentleman." Or, supposing that a stock-broker chooses to put himself down as "esquire," he then is put upon the list of special jurors; but if he finds that he is summoned very often, and thinks that he would get off more easily by being among the common jurors, he then alters his designation to "gentleman," and is transferred to the common jurors.

10. Mr. *Turner.*] Then it is left to the individual himself to decide in what way he shall describe himself?—Yes.

11. And no inquiry is made as to his real *status*?—No; no sufficient inquiry.

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24 June 1867.

12. Mr. *Huddleston.*] Every person who is an Income Tax Commissioner is exempt, is he not?—Yes.

13. Have you found that the quality of the special jurors summoned has been deteriorated very much since the Income Tax Commissioners have been exempted from serving on the jury?—No, I do not know that it has.

14. *Chairman.*] Will you kindly proceed to state, the names being on the list, that is to say, entered on the jurors' book, as it is called, what the next step is, how they are summoned, confining yourself to the county of Middlesex, and not including the City of London?—When a special jury is wanted, the attorneys on each side attend before the sheriff, and 48 names are taken out of the ballot box.

15. For each cause do you mean?—Forty-eight for that particular cause; and then each side strike off 12, leaving 24, and those 24 are the jurors summoned for that cause.

16. And they are summoned, we will say, to attend on a Monday morning?—Yes; on a given day, and for a particular cause, and for that cause only.

17. And that cause may come on on the day for which they are summoned, or it may be postponed two or three days or a week, or as long as a fortnight possibly; has it ever happened that it has been postponed for a fortnight?—The sittings do not last so long as that.

18. Might it happen that a special juror was summoned for a particular cause, and that the cause was not called on for a week?—Very easily; the cause might be postponed, or some cause or causes before it on the list might have lasted much longer than was expected.

19. And the juror is bound to be there when his cause comes on?—Yes.

20. In the event of his not being present, what is the fine for non-attendance?—£. 10; 10*l.* is the usual fine, but it may be increased at the pleasure of the judges; practically, I have never known more than 10*l.* imposed, but I believe that if special jurors would not attend, judges would have power to impose a higher fine.

21. To what amount might that fine be raised?—I do not know; practically it is never more than 10*l.* I should say, to complete the matter, that the result of the present system of getting special jurors in Middlesex is, as I understand, that the whole number of special jurors for Middlesex is about 1,800. I heard the under-sheriff for Middlesex give evidence before the Law Amendment Society to the effect that the whole number is about 1,800 for Middlesex, and he stated his opinion that only about 1,000 of those were really existent, the others having gone away or died, and that the whole number of special jurors for Middlesex available ought to be about 10,000. It is a great inconvenience in practice having the 800 dead men, or men who have gone away, on the list, because they are summoned for ever, summoned over and over again, and there is the expense of summoning them; and the panel, of course, proves illusory.

22. Mr. *Freshfield.*] How many causes have you at one sitting in Middlesex?—It varies very much; in each of the three courts about a hundred causes for Middlesex, usually speaking.

23. If that is so, you have more than exhausted the whole list of jurors?—Yes.

24. Mr. *Huddleston.*] Then the same jurors are sometimes summoned upon more than one cause in each of the three courts?—Yes; the juror may be summoned in more than one cause, and more than one court. I may mention that after term there are always sittings to try special jury cases. Three courts of the three superior common law courts for the trial of special jury causes, and veryoften more than that. At this moment there are two Courts of Common Pleas sitting to try special jury cases. Special jurors are also wanted in Chancery, in the Divorce Court, and a great many Sheriffs' Courts that are held for compensation cases; and also in cases where there is no plea, they may settle damages to any amount in the Sheriff's Court.

25. Compensation cases are occurring almost every day?—Compensation cases and other cases, where there is no plea, are constantly being tried before the sheriff.

26. *Chairman.*] What are the exemptions, besides being an Income Tax Commissioner, and on the score of age?—They are enumerated in the Jury Act; but besides those there are a great many which are not mentioned in that Act. For instance, a great many people who are exempt by charter, barber surgeons, and a number of cases of that kind, in which I can only excuse the jurors when they bring their charters.

27. And do those exemptions still hold good as such?—Yes; they do.

28. Mr. *Huddleston.*] How many cases of special juries would you have on the average in the Common Pleas for the day?—Four is the lowest that I ever put in the paper, unless under very exceptional circumstances.

29. Usually eight, is it not?—I always appoint a great many more than four to begin with; but I calculate upon having at least four left for actual trial.

30. Mr. *Brett.*] More than four cases, you say, you appoint?—I appoint more originally; but they are reduced by withdrawals, by some of them being deferred for one reason or another, or otherwise disposed of, either for the time or altogether.

31. When you appoint them, are the juries summoned at once?—It depends upon the parties; if they think that they are going to trial they summon a jury.

32. What parties are they that summon them?—Whoever has the rule for a special jury.

33. Mr. *Huddleston.*] To get at the number of special jurymen in attendance, generally speaking, at Westminster Hall, will you tell us how many there are in each court?—I will take to-day. It is probable that I appointed for to-day from 12 to 16 causes, thinking that that would leave a residuum of about four eventually for trial, and of those it is quite a matter of chance in how many the juries were summoned.

34. You have eight in the list for the first court, and two for the second; I find that makes 10 in the day?—Yes.

35. That is to say, jurymen in the Common Pleas alone have been summoned?—Yes.

36. How many are there in the Exchequer to-day, do you know; about seven or eight, are there not?—You will see that by the "Times."

37. And in the Queen's Bench; about six in the two courts?—Yes, I dare say that is so. I may state that when money is scarce in the City, as, I believe, the expression is, or, in other words, when the rate of interest is high, the daily

lists sometimes have to contain as many as nine or ten causes. It is a great advantage to the defendant not to be made to pay immediately, and so the causes are kept in the list till the last possible moment; that is to say, the defendant does not give in till the last moment. I have found by experience that when money is at high interest in the City, the cause lists have usually to be very long.

38. Mr. *Headlam.*] If there are only about a thousand available men, as you say, on the special jury list for Middlesex, it is possible that there may be 500 or 750 of them summoned without any very exceptional cases?—Yes.

39. Mr. *Huddleston.*] And that would be for the three courts, omitting the Probate and Divorce Court, for which there might be three or four special jurors; you have known that to be so probably?—Yes.

40. So that you might have a thousand jurymen summoned altogether?—Yes.

41. Do you find that jurymen are continually complaining that they have got summonses on the same days for different courts?—Yes; they come to me sometimes with a bundle of six or seven in their hands.

42. Mr. *Brett.*] The 720 who may be summoned on one day are not necessarily 720 different jurymen, I presume?—I may say, in answer to that question, that a juryman who is summoned on the first cause in the Court of Common Pleas, for instance, to-day, is very likely to have his name upon the succeeding causes. I observe that the same name frequently runs through the panels for the day. It will be seen by the Jury Act that the attorneys, when one panel has been drawn, may adopt that panel if they like for a succeeding cause, and even if they do not do so, the names are put back in the ballot-box and are drawn again, probably first, through being at the top. Hence you find that the same name runs through several of the panels for the causes for the day; that is constantly occurring.

43. Mr. *Whatman.*] Are there not several other courts, besides those you have mentioned; some in the city, and others?—Yes.

44. Mr. *Brett.*] Do I rightly understand you that the moment one jury is struck on attending for the sheriff, the very same names of that jury are thrown into the box again?—Yes.

45. So that the same man may be called for another cause?—Yes.

46. Mr. *Turner.*] If the names are stirred up that will not necessarily happen, will it?—No, but to do that has not been within my duty; I never even witnessed the process of striking a jury before the sheriff.

47. *Chairman.*] The overseers and churchwardens, as I understand you, are the persons who place the special jurors on the list?—They supply the names.

48. What do they do with that list; do they give it to the sheriff's officer?—I presume that it will be necessary upon that point to examine Mr. Burchell, and he will give you all the details; these proceedings are not within my cognizance as associate.

49. Mr. *Headlam.*] You see the practical evil at last?—Yes, I see the names that come to the court; till then I have no personal or official knowledge of the matter; it is no part of my duty to summon jurors.

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50. Do you hear a great deal of discontent expressed on the subject?—Yes.

51. And you see a great number of persons constantly attending who are not in reality called into practical operation on any particular day, that is to say, needlessly called without being placed on a jury in the course of the day?—Yes.

52. Mr. *Brett.*] In those cases that you have mentioned where the defendant keeps a cause on the list until the last moment, although he intends to give in at last, the jurymen in that cause attend the whole time; then, at the last, the defendant gives up, and then they are not called upon, and get no pay?—Yes, that is the case.

53. Mr. *Huddleston.*] In many instances the causes are withdrawn, and the jurors then are not paid?—Yes, when the causes are withdrawn, the jurors are never paid.

54. And sometimes causes are settled without taking a verdict on terms, a judge's order or whatever it may be made, and there again the jurors are not paid?—Yes; and when causes go off for want of a sufficient number of jurors, those who are in attendance and ready to serve, cannot be employed or paid.

55. When neither party will pray a *tales*, you mean?—When neither party will pray a tales, or when a tales is prayed, but there are no common jurymen available as talesmen in attendance.

56. *Chairman.*] Does the same system prevail in London as in the county of Middlesex?—The machinery for summoning is not quite the same, but Mr. Potter is more familiar with that matter than I am.

57. What remedy would you suggest for the excessive number of jurymen who are summoned for any one particular case?—I have thought that if the court had a sufficient supply for the day to try any causes that were brought before it, if it had, say 30 for the day, that would be abundantly sufficient.

58. Mr. *Huddleston.*] You propose a panel of special jurymen; instead of having a separate special jury for each record, you propose a panel of separate jurymen?—Yes.

59. Would 30 be enough for that?—I think so.

60. One jury may be going out to consider their verdict, and then you have to allow for challenges?—I think that if one jury were in the box and one jury in attendance, with six persons besides, to allow for challenges, that would be sufficient.

61. Would not that be a very small number; suppose that a jury retired to consider their verdict, and that you called on another cause, would 18 be enough to get a jury from, looking at those who may be ill and those who may be excused, and those who may be absent, and those who may be objected to?—I think so. There is one remark that may be made on that point. At present, if common jurors run short, we borrow from the other courts, but we cannot do that with the special jurors, because a special juryman can only sit upon the particular cause for which he is summoned. We might do the same thing to a limited extent, I think, with special jurors: we might borrow some, in emergencies, from the other courts if they were waiting there unemployed, and could be spared.

62. Mr. *Headlam.*] Do gentlemen try to be upon the common jury list in preference to the special jury list?—It is the opinion of the undersheriff,

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sheriff, I know, that they do. Under the present system, if a man knows the way to set about it, I am quite sure that if he put himself upon the common jury list he might escape from serving altogether.

63. *Chairman.*] How might he escape?—In this way; where a common jury is to be summoned, if 60 common jurors are wanted, 100 summonses are given to the summoning officer, and it is supposed that those 100 summonses will produce about 60 men. The sheriff's officer is at liberty to leave those summonses in what order he pleases, and there is no reason why he should go to one man before another. I can hardly suppose that any sheriff's officer, if he had the slightest reason for omitting one man, would not go to the others first; no account is given of the 40 summonses which are not served

64. Mr. *Brett.*] You say that the special jury list in Middlesex contains about 1,800 names?—So I understand.

65. Have you any notion what the number of the common jury list is?—No; we always get plenty of common jurors.

66. Mr. *Headlam.*] Is the machinery much the same for them?—The common jurors are selected in a different manner.

67. Their names are supplied also by their overseers and churchwardens in the first instance, are they not?—Yes.

68. And then the book is made out?—Yes; but there is a sort of *rota* for them: they are not taken over and over again.

69. They are not summoned for particular causes?—No.

70. *Chairman.*] You recommend that there should be one general panel for each court, as I understand you?—Yes.

71. Would all causes be brought before that panel?—All the special jury cases.

72. Mr. *Headlam.*] You would do away with the practice of summoning special jurymen for particular causes?—Yes.

73. And in that respect you would assimilate the practice with respect to the special juries to that which now exists with respect to common juries?—Yes.

74. Mr. *Turner.*] In my experience of special jury cases, the list is settled between the plaintiff's and the defendant's attorney, and they strike out all the names that they think objectionable. It is the fact, is it not, that they do settle the jury in each particular case before the cause comes on?—They do.

75. And it is settled between the attorney and the plaintiff in common?—Yes.

76. Mr. *Huddleston.*] In the country they have a panel, but they also may strike a special jury under the old system, may they not?—Yes.

77. Do you know how that happens?—I think that it is very rarely done, is it not, in the country?

78. It is done. Do you know how it comes to be done?—Either the plaintiff or defendant must apply for a special jury. It is the same rule with reference to Ireland; it is in the same words.

79. Mr. *Brett.*] You suggest 30 special jurors in each court; would you see any objection to making it 36, so as to give three juries?—No, not the least, as far as the court is concerned. But to save time and trouble to jurors, as much as possible, it is not desirable to bring more of them to the court than are really wanted, and I think that 30 would be enough.

80. Upon that, would you propose to give a right of challenge?—Yes; I think that that is absolutely necessary.

81. Would you give that right of challenge to any extent, or to a limited extent only?—It must be limited. Either party might be allowed to challenge, say three, without assigning any reason at all; but, perhaps, a judge's opinion would be better on that point.

82. Mr. *Turner.*] Might not this happen if there were six special juries in the day, and if on each case they might strike out six, that the whole of the 36 might be struck out in one day?—They would be good for the next cause; they would remain in court.

83. Mr. *Brett.*] Would you confine each list to the court in which it is summoned, or would you give the power which you just now mentioned of borrowing from the other courts?—I should have it as it is at present with reference to common jurors. The common jurors are summoned for particular courts, and we only borrow in cases of necessity.

84. Still you have the power of borrowing in those cases?—Yes.

85. Mr. *Huddleston.*] In that case, would you do away with the right to pray a *tales*?—No, I would not do away with that. Speaking generally, it is proper to allow whatever the parties themselves desire.

86. Mr. *Brett.*] Are you aware that where the system you propose is now practised (at Manchester and Liverpool, for instance) in the country, if there are not the necessary number of special jurymen, they can still pray a *tales*?—Yes, I did not mean to abolish that right.

87. Mr. *Headlam.*] Will you explain the practice of challenging in the case of common juries?—Either party that challenges gives notice to the associate before the ballot that he objects to certain people, and those are omitted. Challenging is allowed to any extent.

88. Mr. *Brett.*] In accordance with the law, you mean, I presume, and if they challenge so far as to exhaust the jurymen, you come to the strict right, and then they can only challenge a certain number?—The judge would interfere if it were done with any improper purpose.

89. Mr. *Huddleston.*] The usual practice is, is it not, for the attorney to go over the names, and if he says, "I object to that name," the name is put aside?—Yes.

90. They do that in the country with special jurors also, and when they have a panel?—They never do that with us, because the special jury panel has been agreed upon by the parties themselves before trial.

91. Mr. *Brett.*] Where there is a panel such as you suggest, containing 30 or 40 jurymen, the parties do, in point of fact, say to the associate, "Do not call certain men;" is not that so?—I do not know that as within my personal experience, but no doubt it is so.

92. You say that you would give a limited right of challenge?—Yes. Mr. Huddleston was speaking just now of the cause list for to-day. I should mention that the Common Pleas list for to-day supplies an example of some of the inconveniences that have been spoken of. There are two cases at the top of the list for to-day which were appointed for one day last week.

They were two days in the paper, and the jurors, f course, were in attendance, and then, because he witnesses were not ready, the cases were deerred till this morning. Those cases both refer o the same matter, and therefore they will no loubt be tried together, and one jury will suffice, ut we have had two juries waiting.

93. Mr. *Huddleston.*] In the first of those ases, we have been obliged to pray a *tales*, there eing only 11 special jurymen, although 48 were ummoned in the two cases?—Yes; in many ases there are cross actions, or there may be an ction by a patentee against several infringers. Ve only want, in fact, one jury in such cases, sually speaking, but a sufficient number of men or several juries are often brought to the court.

94. Mr. *Headlam.*] You do not find, practically, ny great objection to the practice of summoning ommon juries, as I understand you?—No; no great objection.

95. And you would assimilate the practice of ummoning special juries to that which exists in eference to common juries?—As far as having a general panel goes.

96. *Chairman.*] But reducing the number?—Yes.

97. Mr. *Brett.*] Have you considered, with reference to the city of London, where gentlemen are much engaged in business, for how many days you would summon the same panel?—I thought that that was a matter on which special juries of the City might be asked to express their opinion as to what would be most convenient to them.

98. I suppose that, for the purpose of your plan, you anticipate that the list of special jurymen would not be made to the 1,000 merely, but that it would be filled up to the 10,000?—Certainly.

99. So that if gentlemen were summoned for three days, they would be summoned once in five or six years, instead of being summoned every year?—Yes.

100. A gentleman might very well arrange his business so as to give up three successive days, say, if it came once in six years, and would probably be better off than he is now, when he may be summoned every year, and in a dozen different causes?—The inconvenience would be most materially reduced.

101. Mr. *Freshfield.*] Do you think that a panel of 36 special jurors would be enough?—Quite enough.

102. If one jury remained locked up and another were called on, for that 24 would remain; of those a certain number would be sure to be absent; how many challenges would you allow?—I should think that if there were nominally 24 jurors in the court, that would supply an abundant number.

103. Allowing for all the occasions of absence, and all the challenges?—I think so.

104. Mr. *Brett.*] Would you expect, from your experience, that the parties would challenge at all, or that if they did they would challenge much?—No, I do not think so; where challenges occur in common juries it is generally through an apprehension that certain individuals on the panel may, as belonging to some particular trade, sympathise with one or other of the litigant parties.

105. You are aware, from report at all events, that the system which you are suggesting has worked well in very important places; for instance, in Manchester and Liverpool?—Yes.

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106. And there, although sometimes there are challenges, do you know that they are not frequent?—I do not know how frequent; I have been on the circuit as marshal, but I have not had sufficient experience to say how frequent they have been.

107. Mr. *Headlam.*] Do you think it desirable to keep up the distinction between special and common juries?—That is a question upon which I think that my opinion is of no value; I should prefer, at least, not to express it.

108. *Chairman.*] What steps do you think should be taken to prevent a special juryman being summoned for more than one court at a time, because that is a great grievance at the present moment, as I understand?—If there were some sort of *rota* it could not take place.

109. Then you suggest that there should be a *rota* for each court of the special jurymen who would be called to serve in that court, and that they should not be liable to serve in any other court except that one?—If there were a general *rota*, so that the special jurors should be taken in turn all down through the book, a juror could not be summoned for more than one court at a time.

110. Would there be any unfairness in taking them as they stand on the list, or how would you apportion which jurymen should belong to one court, and which to another?—I think that when a special jury was wanted, the first names that presented themselves in their turn should be taken.

111. You think that it is not necessary to make any distinction between one court and another in that respect?—I think not.

112. But that whatever the number of jurymen might be, they should be liable to serve in one court only, and that they should be made to stand alphabetically, or by parishes, I suppose?—I think it is a matter which could be most easily arranged in any one of many ways, if you adopted the principle of having a *rota*.

113. You still adhere to your opinion that 36 would be a sufficient number?—I think so, even more than sufficient.

114. With reference to the question of remuneration, have you any suggestions to make; do you think that the special juryman at present is inadequately remunerated, or sufficiently remunerated?—I think that, at present, the evil is, that it is so very uncertain, and that the special jurymen so often get nothing at all.

115. From the cause not coming on on which they are summoned?—Yes; I may mention an instance of that; some little time ago in the Court of Common Pleas, there was a case which was put in the paper, one of those cases in which the plaintiff wished to get something by intimidation (a great many such actions are brought), hoping that the defendant would compromise. The cause was in the paper for four days, but was not reached, owing to the unexpected protraction of the trial of the case which preceded it. At last when I was actually calling the jury, the plaintiff withdrew the record, and would not pay the jurors anything at all, that being the fifth day they had been in attendance. On the next sittings he entered the cause for trial again, and then I would not appoint it. I said that he had behaved so badly to the jury on the occasion before, that he must appeal to the judge if he wished to have an appointment, in order that there might be some guarantee that he really intended to

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to proceed to trial. He applied to the judge, and the judge required some guarantee or engagement that the cause was really intended for trial; no such engagement was made, and the cause went over.

116. Mr. *Freshfield.*] Was that refusal to appoint legal?—Our duties are very undefined, and I considered that that was really my duty. I gave the plaintiff notice that I thought his conduct to the jurors had been so very unfair that that was what I should do, and that he must apply to the court to correct me. I merely refused to appoint the cause till he had applied to the court. I had no means of controlling him, or making him enter into any engagement to myself.

117. *Chairman.*] Perhaps you will give us your opinion whether a payment per day would be better than a payment per cause; at present it is a guinea a cause in special jury cases, is it not?—Yes, a guinea.

118. Do you think that a payment of half a guinea a day during attendance, whether the case was tried or not, would be a better plan?—I think that almost anything would be better than the present system, which is so entirely a matter of chance. The payment of special jurors might be arranged as that of the common jurors is. The common jurors in Middlesex are paid a shilling a cause, and those who have served can either take the money at the end of the day, or it can all be left till the end of the sittings, and then divided amongst those who have served during the sittings. I have tried both plans, and they give about equal satisfaction.

119. Mr. *Huddleston.*] There is a considerable objection, is there not, to the payment of special jurors; there are those who object to special jurors being paid at all?—I have had no such objections made to me.

120. Mr. *Headlam.*] Do you think that the payment should be made at an earlier period, so that the plaintiff who withdraws a cause should still have to pay for the jurors summoned?—Yes.

121. Mr. *Brett.*] Do you think that it would be a good plan that a party should pay a fee if he asked for a special jury?—If there were a general panel that question would not arise.

122. But where there is a general panel now, the payment to the jury is made just as under the other system, is it not; when the cause is tried the party who has applied for the special jury pays twelve guineas?—Yes, after the trial.

123. Would not you think it a better system that when a party asked that his case should be tried by a special jury, he should then pay to the sheriff a fee, whether his cause was tried or not?—That would be a very good plan.

124. Supposing that the panel were 36, and that they served for three days, do you think that it would be a better plan that every juryman summoned should be paid five guineas a day for the three days; the fund to be collected by every person who applied for a special jury paying a guinea for each juror?—The payment would then be uniform, and that would be a great improvement on what it is now.

125. Does it make any difference to the special juryman summoned whether he is sitting in the court or in the jury-box; he is losing his time in any case?—It is not quite the same; a juryman who is in the box is kept there, of course, till the end of the trial, but if it is a long case, about the middle of the day we dismiss those who are waiting, so that those who are not in the box are no kept so long as those who are.

126. There might be cases, I suppose, wher you would require the whole 36 to remain i court all day; does it not seem to you that i they have to remain in court all day, it makes n difference to them whether they are trying th cause or not?—Practically, we should not kee them there all day.

127. Mr. *Huddleston.*] You mean that if it i a long case, in the middle of the day you woul dismiss all the jurors in attendance?—In th middle of the day, or earlier; as soon as it coul be safely done.

128. Mr. *Denman.*] If they were all to be pai beforehand for their services; the whole havin got their payment, it would be worth the whil of a man who wanted to escape, to pay one of th others to do his work for him, would it not?— He would be very liable to be found out if he di not attend.

129. You would have to be very strict to guar against that, I presume?—Yes.

130. Mr. *Whatman.*] Do you know that o the present system some men shirk the duty systematically, and take the chance of the fine?— Yes, great numbers do.

131. Mr. *Brett.*] There is a well-known system, is there not, that when you call a specia jury they do not answer to their names, but wai till the judge begins to say that he will fine them and then the answer comes?—Yes; I may mention this, that at Guildhall I have constantl begun to call a special jury when there has no been a single special juryman in attendance; the have been behind a screen, and they have turne up afterwards.

132. When the judge begins that he will fin them 10 *l.*, they come from behind the screen?— Yes; I have constantly called them when ther has not been one special juror in view.

133. Mr. *Headlam.*] Do not common jurymen complain of the special jurymen being paid?— I have never heard any common jurors make an complaint about the comparative treatment o themselves and special jurors.

134. Mr. *Brett.*] Do you think that where a cause lasts, as it does sometimes, for a good many days, it is fair or just that they should only be paid one guinea?—It is very hard upon them.

135. Mr. *Denman.*] It would be hard upon the client, would it not, because the case had lasted many days, to make him pay for every day?— Yes.

136. Mr. *Charles Wynn.*] What is the reason that a juryman, for instance, in London, is called upon so often?—The reason is, in London, that the list of people liable to serve as special jurors is limited; it is composed of those only who come under the designation of "esquire," "banker," or "merchant;" and that excludes in the City many people whose business is of great importance; colonial brokers, for example, and persons of that class.

137. Mr. Alderman *Lusk.*] The special list includes merchants as well?—Yes; bankers, merchants, or esquires.

138. Do you think it desirable, as far as your experience goes, that it should be confined to those three classes?—In Middlesex you would get enough special jurors, probably, in that way; but with reference to the City, I think that that

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is a matter upon which the City people must be asked to speak.

139. Is there any reason, as far as you know, why they should confine it to those three classes? —You want to get educated people, if possible, for special jurymen.

140. Do you think it necessary to confine special jurymen to the three classes of merchants, esquires, and bankers; there are thousands of other men that are just as well qualified, I presume, as those three classes; is there any reason why it should be confined to those classes?—No; provided that you get educated people, I think that you might adopt any description of them.

141. Does not the confining of it to those three classes circumscribe very much the field for special jurymen?—Yes; as the law is interpreted at present it certainly does.

142. Colonel *William Stuart*.] Stockbrokers do not serve as special jurors, do they?—A stockbroker in Middlesex, if he called himself an esquire, would be put upon the special jury list.

143. Do you ever find personation practised? —There have been one or two instances, I believe, of attempted personation since I have been an associate; but they are not common.

144. Mr. Alderman *Lusk*.] Supposing that you confine the special jury to those three classes, if you take a merchant in London, do you think that a guinea for a cause is anything like payment for a man of standing?—It is not worth his while to do it for that, and no doubt a guinea a day is very poor payment; his time would be worth much more than that.

145. If you put it on the ground of duty to his country, it would be better not to insult a man with payment at all?—Most men would prefer to have a guinea rather than nothing.

146. But supposing you do pay him, as everybody else seems to be paid, from the judge downwards, do you think that a guinea a day is adequate?—It is not sufficient compensation to him for his loss of time; but it would be a severe tax upon the suitors if they had to pay more than falls upon them at present; even at present, the 12 guineas is a severe tax upon them.

147. Does the 12 guineas to the jurymen bear any proportion to the other expenses of the trial? —No, perhaps not; still it is a heavy tax.

148. You ask 12 men not only to come away from their business for one day, but sometimes for six days, and you give them a guinea, and tell them that you are much obliged to them; is that anything like adequate payment to those men?—No.

149. Mr. *Huddleston*.] I suppose, also, that the 1 *s.* that goes to the common juryman is not adequate payment to a respectable tradesman?— No.

150. Mr. *Charles Wynn*.] As far as your experience goes, should you say that there was any necessity in the metropolis for any distinction between special and common jurymen; is not the common jurymen in London or Westminster, considerably above the majority of special jurymen in the country?—There are, no doubt, a large number of common jurors in London who are quite fit to try many special jury causes. But there are a great many cases in which it is necessary to have men of education; for instance, to try patent cases it is essential to have educated persons. If you had a jury of mere shopkeepers, however intelligent, the jurors would not possess sufficient readiness of apprehension to follow the opening statement in a patent case for five minutes.

151. Would the ordinary panel of a special jury meet that difficulty better than the panel of a common jury, without a special selection?— We have a higher class of men on special juries than there are on common juries now.

152. I understand you to allude to cases requiring special fitness; patents, and scientific cases?—There are a great many special jury cases in which it is necessary to have men of education. I merely instanced patents as one class of cases.

153. Mr. *Freshfield*.] In the larger commercial cases, could a common jury, on the average, understand them?—I should think certainly not.

154. Mr. *Huddleston*.] And then there are prejudices, are there not, that operate very much? —Yes.

155. Mr. Alderman *Lusk*.] As a matter of fact, do not you take common jurymen to make up special juries?—We are obliged to do so now.

156. Mr. *Brett*.] The view of the parties themselves is such that wherever the cause is an important cause they ask to have it tried by a special jury, although they know that they will have to pay 12 guineas for doing it?—Yes.

157. Mr. *Headlam*.] Are there any returns that could be laid before the Committee, to show the average number of special jury cases, and the sums paid by the suitors for the payment of special jurors during the year?—I could tell you in the course of a few hours the number of special jury cases that have been tried in the Common Pleas during any period.

158. And could you give us any paper, showing us about how much has been paid by the suitors in the payment of special jurors?—Yes.

159. You can lay before us some return of that kind, which would enable us to know the number of cases, and the amount expended?—I could tell you the number of special jury cases that have been tried in the Court of Common Pleas during the last 10 years.

160. Mr. *Denman*.] Would you tell us on what number of those cases they pray a *tales*?—A full special jury is obtained in about one in four cases, and in the other cases the number of special jurors varies from eight to ten; that is about the average.

161. *Chairman*.] The remainder are made up by *tales* men?—Yes.

162. Mr. *Headlam*.] Of course it is of great importance in a great mercantile cause, that men of intelligence should be on the jury?—Yes.

163. Are there any means of obtaining such men other than obtaining them from the list of special jurors?—There is the reducing of the panel; they get 48 from the ballot-box, and each side strike off 12.

164. There is nothing, either in the selection by the parties themselves or in any other way, to enable them to obtain men specially fitted for that cause?—They must take the 48 names that come first from the box, and then select the jury from those.

165. It is the same in a patent case, I presume? —Yes; they get the best 24 they can from the 48 men.

166. Mr. *Turner*.] But is it not the case that in all the great mercantile and shipping cases the parties ask for a special jury?—Yes.

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167. Mr. Alderman *Lusk.*] Do you know how the juries, whether special or common, are made?—The list is supplied by the overseers and churchwardens of the parishes in Middlesex.

168. I suppose it is a matter of caprice with the overseer or his deputy whether a man is put down as a special juryman or a common one?—I think that that question might be better addressed to the under-sheriff.

169. I suppose you know that it is left to the man's judgment entirely whether he shall make it special or common?—The individual himself certainly in Middlesex can describe himself as he likes.

170. And either the overseer or the deputy can at his caprice put him down as one or the other?—In Middlesex a man describes himself to the overseer, and the overseer forwards that description, and according to that he is made either special or common juryman.

171. I may tell you, as a matter of fact, that in the city of London, where these important cases to which you refer are tried, a man is made a special juryman or common juryman, just according as the man I refer to thinks proper?—That is so, I dare say.

172. Mr. *Freshfield.*] Do you think that 1,800 special jurymen in Middlesex at all represent the number of men that ought to be special jurymen?—No. I heard it stated by the under-sheriff that about 10,000 ought to be special jurymen.

173. Mr. Alderman *Lusk.*] As far as your experience goes, do you think in regard to the better class of men, merchants and men of that class, who are fined so very often, it is from want of inclination to serve, or because they are called upon too often to serve that they allow themselves to be fined?—I think that at present, owing to the long waiting at the court, and the uncertainty, and the numerous summonses, it is much the best policy for a merchant to keep away from the courts, and run his chance of a fine.

174. You think that he looks upon it as the least of two evils?—I think so, and I know they do in a great many cases.

175. Mr. *Charles Wynn.*] Does service upon one special jury act in any way as a release for the remainder of that sitting?—No, not in the least.

176. Or for any future one?—No.

177. Under your plan you would wish that to be so, would you not?—I would have 30 or 36 men at a time, and then those men should be excused from service until all the other people on the list had served.

178. Thirty-six would be summoned in each court, as I understand you?—Yes; for the Court of Common Pleas say, and then after they had served their three days, or some stated period, in the Court of Common Pleas, they would be free till their turn for service came round again.

179. That would be twice 36 for the Court of Common Pleas, and twice 36 for the Court of Exchequer?—No; only 36 at a time.

180. I was supposing two courts sitting in each case; will the number you mention provide for that?—Yes.

181. That would be three times 36 for each sitting for the three superior courts?—Yes.

182. *Chairman.*] On an average, how long do the sittings last in the superior courts?—Aft
term sittings, when the special jurors are want
last, 24 days; 10 or 11 in Middlesex, and t
rest in London; sometimes it is 10, sometim
11, and sometimes 12 in Middlesex; we divide
according to the business.

183. Are you aware what length of notice
juryman receives when he is called upon
serve?—A special jury is constantly summon
the night before, the notice is very sho
sometimes it is a day before.

184. That is a fruitful source of complai
too, is it not, the inadequacy of the length
notice?—Yes; it is always an inconvenience.

185. Mr. *Denman.*] You say that the comm
jurors in London and Middlesex, as I und
stand, get a shilling a cause?—In Middlesex
shilling, in London eightpence.

186. But if they sit on a special jury th
get 10*s.*, do not they?—They get a guinea.

187. Has not that custom grown up of la
used it not to be half a guinea?—It has be
always a guinea in my time.

188. Mr. *Headlam.*] What do they get
trying criminal cases?—I have nothing to do w
the criminal courts.

189. Mr. Alderman *Lusk.*] Could you tell
why I used to get (and my case is only a sam
of thousands of others) five, six, seven, or eig
summonses at one sessions at Guildhall?—It aris
from this, that the names are drawn for a spec
jury from a ballot box; as soon as the jury h
been struck, the names are put back in that ball
box, and the name at the top may be drawn aga
and may be drawn any number of times; the
is no sort of *rota*, so that it is very likely to co
again.

190. How is it that there is such an immen
number of causes put down at one time in t
courts, so that if you are summoned for many
them you go backwards and forwards, and y
do not know which to go to; for example, I r
collect that in the Court of Common Pleas the
were on one occasion about seven or eight caus
in the paper at one time; could not that
avoided?—Only as many causes are put into t
paper as may be reasonably expected to be g
through in the course of the day, and if there a
seven or eight, it is because the associate kno
or thinks that some of those are likely to
settled. I only put in, in making out the list,
many as are likely to occupy the time of t
court.

191. But they do not go off always?—In ma
cases they do not, but I can only form the be
estimate in my power.

192. With five or six causes in each court, y
have in the meantime nearly 1,000 jurymen w
go backwards or forwards from court to court?-
We have usually only three courts where speci
jurors are wanted at Guildhall; it is exce
tional to have more.

193. There is an enormous number of me
going backwards and forwards doing nothing?
That is so.

194. Is it not the fact that the common jur
men are summoned for two or three weeks at
time? — The common juries are summoned
Middlesex for six weeks at a time.

195. Do not you think it a dreadful length
time for a commercial man that he should have
come away, as I have seen him, from his busine

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for three weeks at a time?—I believe that it is ruinous to a great number of men in Middlesex.

196. Colonel *William Stuart.*] Is there any means of obviating that?—I think that the common jurors ought to be summoned for a shorter period.

197. A week or ten days?—Yes.

198. They often attend at Westminster Hall three or four weeks at a time, do not they?—Constantly.

199. Mr. Alderman *Lusk.*] Do not you think, from what you see and know, that if a common juryman received 10 *s.* a day or a guinea a day, he would come with much more pleasure to attend upon a jury for a few days at a time?—No doubt; but I think that the length of time they are kept there is a much more serious matter than the amount of payment.

200. If a gentleman is kept for a week, do not you think that it would be better if he were to receive a fair remuneration, something different from a shilling a day?—Yes, I think so.

201. You think that he should receive something more adequate to his services than a shilling the day?—They get more than a shilling the day; it is a shilling for each cause, which comes to about 4 *s.* a day.

202. But you think that not adequate, I presume?—It is a very small sum.

203. *Chairman.*] Is not there another cause of complaint on the part of the juryman; namely, that when he has been summoned, and is waiting for the cause to be called on, he is not placed in very comfortable accommodation?—There is no accommodation at all.

204. First of all he has nowhere where he can wait, but he has to fight and push his way to find whether the cause on which he is summoned is called on?—Yes.

205. Then when he gets into the box, the accommodation is very defective, is it not?—Yes; and the inconvenience is not to the man himself only, but to other people too, because the special jurors who are waiting, if they get seats, fill up the court, and that prevents persons interested in the causes which are being tried from entering. The space in the courts after the barristers have been accommodated is very small.

206. Have you thought over the question how that could be remedied?—Yes, I wrote some time ago a recommendation for the commissioners of the new courts about it. Chief Justice Bovill desired me to give it to him, and he took charge of it, so that I believe that the matter has been or will be properly represented. It is merely required that a waiting-room should be provided.

207. Mr. *Freshfield.*] Is not that proposed to be provided in the new courts?—I believe so.

208. *Chairman.*] Do you think that you could sum up in a few words the changes you think adequate with reference to summoning jurymen, their attendance, and their remuneration. I know that you have written a very valuable pamphlet on the subject, but if you could sum up the changes that you think adequate in those respects, I think it might be advantageous?—In the first place, there ought to be one general panel of jurors for special jury causes to try any cases that may be brought before them, and there ought to be also a rota.

209. For each court?—No, one general rota.

210. Mr. *Denman.*] Will you allow me to interrupt you, to ask whether you have taken into consideration in considering these questions, the extent to which special jurors are required, for compensation cases especially?—Yes.

211. Would you include them in the proposed arrangement; would it be for all cases for which special jurors are required?—Yes, I think it would be better to have one general rota; if that principle were adopted, the rest would be matter of detail.

212. *Chairman.*] Would it include the Divorce Court or the Court of Probate and the Chancery Court?—Yes.

213. What would the number of those courts be altogether?—Now there are six superior courts of common law in which special jury cases can be taken.

214. The Exchequer, the Common Pleas, the Queen's Bench, and then the Divorce and Probate; that last is one court divided into two, is it not?—Yes.

215. And then the Court of Chancery?—Yes, there are several courts of chancery, and then there is the sheriff's court.

216. For compensation cases?—And other cases; when it is only to assess damages, the sheriff may try cases involving any amount.

217. This rota is to serve for all the courts, I understand you?—Yes, I think that that would remedy the whole matter.

218. You have not said anything definite, I think, with reference to remuneration. There has been a good deal of discussion about it, but I did not gather from you what your views are on the question; whether any change should be made in the remuneration of special and common jurymen?—I mentioned in my pamphlet (and I will use the same words now) that if the present system of remunerating special juries were continued, if we had a general panel, something like an equable payment could easily be adjusted by the associate.

219. How are we to understand "an equable payment?"—For instance, if 12 guineas were paid on each cause which was tried, and then at the end of the three days (supposing the jury to be summoned for three days) that money were massed together and divided among those who attended, that would be one way.

220. Then would you not remunerate those who were called to attend, but whose causes were not tried?—All those who were brought to the court would serve in turn under that system.

221. Mr. *Brett.*] At present, where this system is at work, are you aware that the associate generally does equity in that way, by allowing the jurymen to be in the box to try, say three causes, and then changes them?—That is what I do myself in the case of common juries. I am bound by the Act of Parliament, after calling a common jury, to replace the names in the ballot box, and then ballot afresh for another jury; but in practice I never do that. I put the names aside, and take the jury from the names remaining in the ballot-box, consequently I get through the whole list of jurors. If it were not for that arrangement some jurors would be always waiting in court and never receiving anything, and others would be in the box the whole time. Therefore I violate the Act of Parliament every day for the sake of fairness.

222. *Chairman.*] I presume also that you would take steps that one juryman should not be summoned

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summoned for more than one court at a time?—If there were a rota he could not be.

223. Mr. *Brett.*] The remuneration, you say, should be divided?—Adjusted by the associate.

224. *Chairman.*] I think I have gathered that you would rather not speak on the revision of the lists; that is more a question for the summoning officer and the parish authorities?—Yes.

225. But it is well known that they are very imperfectly kept, is it not?—Yes; I think that the revising barrister might revise the lists. I might mention an instance showing the way in which the lists are kept: last November I ascertained that they were then summoning special jurors from the sites of the houses in Grosvenor-place, which had been pulled down, and also from the sites of various houses which had been pulled down in St. John's Wood for making a railway; the houses had been gone a long time.

226. Do you think that those lists could be revised at the time that the Parliamentary lists are revised?—Yes.

227. Mr. *Brett.*] The Parliamentary voters are not identical with the jurors, are they?—No.

228. The substance of your suggestion would be that there should be a revision of the list by a barrister, once a year?—Yes.

299. Not necessarily the Parliamentary revising barrister?—No, not necessarily the Parliamentary revising barrister. It might be stated that the present system has this effect, that we always have too many special jurors in the court, but of those we seldom have enough available for the cause in hand; that is to say, we always have a great number waiting unemployed, and yet in 75 cases per cent. we cannot get 12 for present use.

230. Mr. *Denman.*] Are those all your suggestions?—I only venture to make two suggestions, one is as to a general panel, and the other as to a rota.

231. All your observations, although not confined to them, are more particularly appropriated to London and Middlesex?—Yes.

232. Have you also considered the condition of things at the assizes, upon which you have very often been marshal; and do you conceive that that is perfect, or that some alteration ought to be made on the circuits as well as here?—I have not had much experience on the circuits, but it seems to me that things work well.

233. As to a rota, that would be applicable to the circuits as well as to London?—Yes.

234. With reference to a general panel, that already exists in the country?—Yes, in Surrey a rota has been adopted, I understand from Mr. Abbott, the under sheriff for Kingston, and that it works remarkably well.

235. Mr. *Whatman.*] For special jurors do you mean?—For special jurors.

236. Mr. *Headlam.*] You would, as I understand you, take a rota for all these different courts?—The same system might be adopted with reference to special juries that is already adopted with reference to common juries. When a common jury is wanted for Middlesex they take from the jurors' book the 60 men whose turn it is to serve; and if you wanted a special jury I should propose that you should do the same thing; that you should take the necessary number of men whose turn it was to serve.

237. But you see that there are in this case a great number of different courts, all sitting contemporaneously?—Yes.

238. How would you, in practice, make the rota for all those different courts. Whilst the causes come on consecutively one can understand it, but when the courts are sitting contemporaneously, there seems to be some difficulty in forming the rota, does there not?—No, I think there would not be any. Supposing that you wanted 36 men to serve at this moment in the Common Pleas, and 36 in the Exchequer, and the same number in the Queen's Bench, you would take the 36 first in the list, put them down as jurors to serve, and take them for the Common Pleas; then the 36 next for the Exchequer, and the 36 next for the Queen's Bench; and in that way you would go through the book regularly.

239. Mr. *Denman.*] You would not have any of those serve again until all had served?—No.

240. You have mentioned Mr. Abbott, the under sheriff of Surrey, and you say that he tells you that he has adopted a rota, and that it works well; how long ago has that been the case?—I think he said it had been in force about 13 years.

241. Mr. *Headlam.*] You do not think that, as I understand you, that it would be difficult in practice in Middlesex, in consequence of the number of different courts. When you take it for one county, the courts there are sitting consecutively; still you do not think that the fact that all these courts are sitting, with a good deal of uncertainty as to when any special case would come on, would make any difference in the rota?—No, not the slightest.

242. *Chairman.*] Mr. Abbott has found the system work well you say?—He has told me so.

243. Perhaps the lists are kept more carefully in Surrey than in Middlesex?—I do not know how that is.

244. Do you know the number they have of special jurymen in Surrey?—No; but I know that it is very much less than it ought to be.

245. Mr. *Brett.*] How many years have you had experience of these things?—Seven years, as associate.

246. Have you found that in practice you see the same special jurymen very often?—For ever and ever.

247. Have you any notion that, although there are a great many people who avoid being special jurymen, yet there are certain people in the City of London who court it?—Yes.

248. That is to say, they make an income by it?—Yes.

249. How do they manage to get upon the juries; do you know?—I do not know.

250. Do you know by report, for I do not think that we are upon strict evidence here, do you know whether they take any means to get upon them?—I do not know.

251. Have you observed, during the last 10 years, the working of the present system, so as to say whether the class of special jurymen in London and Middlesex has deteriorated, in your opinion?—I see no difference.

252. Mr. *Freshfield.*] Do not you think, looking forward to the time when the new courts will be built (in which I understand provision is to be made for trials at Nisi Prius) for both Middlesex and London, a panel might be supplied from time to time for all the courts, with such an arrangement as to provision of room for the jury as would

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would lead to a minimum of inconvenience for the jury?—The practice of borrowing jurors by one court from another, when necessary, would be, in fact, a partial adoption of the principle of having one general panel of jurors common to all the three courts.

253. Is not that probably the ultimate view that we ought to take of the question?—I have purposely not expressed any opinion about that, because it is so much connected with the question as to whether the business of the courts will not be amalgamated in some way (which is often suggested now); that is to say, whether a cause entered for trial in one of the three superior courts of common law may not be tryable in that or either of the other courts, as may be found convenient.

254. But short of that, might not a panel be obtained for all the courts, with accommodation for the jury, and arrangements made by which that panel should supply the jurymen for all the causes, both common and special?—Yes, that could be very easily done.

255. Mr. *Brett.*] It would involve, not a separate list for each court, but one list for all the courts?—Yes.

256. Mr. *Huddleston.*] Do not you find a great complaint on the part of the common juries, that they are required to sit too long during term and after term?—Yes; I think it is almost, indeed quite, ruinous to a great number of common jurors to be brought, as they are, to the court for six weeks continuously.

257. You propose that the panel of special jurors should sit only for a certain number of days, and that you should then have a fresh panel afterwards?—Yes.

258. Mr. *Denman.*] That is done at Maidstone and in other places?—Yes, in York, and in Manchester, and in Liverpool.

259. Mr. Alderman *Lusk.*] You mentioned that the same men are, in London, on special juries very often?—Yes.

260. Does that come from their desire to serve, or because the attorneys' clerks pick out the same men?—That is very difficult to answer; I do not know how to give that information.

261. You say that some men want to get a living by it; it would be a small living, would it not?—There are a certain number of such persons who are called familiarly "guinea pigs."

262. Do you know, as a rule, whether the attorneys' clerks always pick out the same men to serve on a jury?—I should think they do.

263. As a rule men do not want to serve, do they?—As a rule, it is not at all likely that they should.

264. Do you know that a great many merchants are summoned again and again and fined?—I know that they are summoned again and again. I might mention a case that would show the illusory nature of the panels; I have seen, by looking back at some notes, that one day in the Common Pleas there were 37 jurors fined, and that in the result every one of those was excused; there was not one case in which the fine was enforced.

265. Mr. *Denman.*] Have you given us a copy of your pamphlet?—I have same copies with me (*handing in the same to the Committee*).

266. *Chairman.*] On the question of the list being revised by a revising barrister, do you think it would be right that any man who claimed exemption should appear personally to claim such exemption, or that if he did not appear personally, then his name should remain on the list and he be liable to serve; would you require either personal attendance to give exemption, or a claim made in writing?—That is rather a difficult question, and I do not know how to answer it.

267. I do not quite know what the exemptions are which are now in force?—There are a great number of exemptions under the Jury Act, and besides that there are a great many people who are exempted by charters and prescriptions, and under other Acts of Parliament.

268. Then their names ought not to appear properly on the list?—No.

269. How would the revising barrister know that, unless personal application was made to him?—He cannot know it unless personal application is made to him.

270. Then it comes back to what I was asking; do not you think that application should be made either in writing or personally to the barristers who revise the list, by those gentlemen who think that they ought to be exempted?—Yes.

271. But their names once remaining on the list, they ought to be liable to serve?—Yes; but it appears to be a little hard upon people who were not aware that they were on the jury list at all to find themselves fined.

272. Mr. *Brett.*] But inasmuch as they did not avail themselves of the right opportunity, they could not afterwards claim exemption?—I mean a case where a man was not aware that he was upon the jury list at all, and the first notice that he had of the fact was being summoned to the court.

273. Might not that be obviated by giving notice to every person who was to be put upon the jury list?—That is the only solution of the difficulty which I can think of.

274. Mr. *Whatman.*] If the lists are made out in the same way in Middlesex as they are in the counties generally, there is always public notice before the lists are given to the magistrates, is there not?—Even supposing that there is public notice, a man does not see it necessarily. I should mention that the special jury lists are copied out by the the attorneys' clerks on a panel; those panels are sent to the associate to call the jury from, and the addresses given in those panels are very often extremely imperfect, and a great deal of trouble is given to the Post Office in consequence of notices of fines which are sent to these people; very often they go all about the country, and at last come back to the associate. A short time ago I sent out three notices, two of which were returned from the dead-letter office, covered with Post Office marks; and the third address was only, "1, Albany-terrace," which might be anywhere in Middlesex.

275. Mr. *Brett.*] You were asked whether you could give a return of the number of cases tried in the Common Pleas during the last 10 years, and you said that you could?—Yes.

276. Could you give also the number of cases in which the jury were summoned, and where the cases have gone off without being tried?—I cannot tell you whether the jury were summoned, because that is a matter which could not be known to me in a great many cases.

277. Would they not be summoned in every

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case which you put in the list?—No; very often they are not summoned till the last moment.

278. *Chairman.*] You can only give us those that have been tried?—I can only give you those that have been tried; I have no means of knowing the others.

279. Could you off-hand say what sort of proportion the cases tried bear to those not tried; are the cases not tried 50 per cent. of those entered for trial?—I cannot state that at this moment.

280. Mr. *Huddleston.*] When you nominate special juries, you make a list out for six or seven days?—Yes.

281. Then I see "S" put against some cases; what does that mean?—That means a case in which I know that a jury has been summoned.

282. What you call struck?—Not only struck, but actually summoned, which is some indication that the cause is really intended for trial.

283. Mr. Alderman *Lusk.*] Speaking of exemptions, do not you think that a number of people are exempted from serving that ought not to be exempted?—I do not know whether the exemptions are improper, but there are a great number of people who are not on the jury list at all, who ought to be there; I am certain of that.

284. Do you think it is right that an attorney, for example, should be exempted?—Yes; I think that an attorney in practice ought not to be on the jury. If he is not in practice he is liable to serve.

285. Why should he be exempt more than any other man?—One answer to that question would be as follows: I was asked just now whether the same people do not serve continually. I said that they do. I might have added, that any person who serves continually is likely to be a bad juror, and so is anyone who is about the court much; I should say, therefore, that a barrister or attorney would make a bad juror; they are very likely to decide each case, not exclusively on its own particular merits, but probably with more or less refinement, what has been done in some previous case, whether the circumstances are precisely similar or not.

Mr. Serjeant PULLING, called in; and Examined.

Mr. Serjeant *Pulling.*

286. *Chairman.*] YOU have devoted, I believe, a deal of time to the subject of the jury laws, and the improvements that might be made therein?—Yes.

287. You know the Order of Reference, and you are aware, having been in the room during the examination of the previous witness, of the points upon which we are to take evidence and make suggestions to the House?—Yes.

288. Will you tell us what you think with reference to the present system of summoning special juries, before we go into any other branch of the question?—If I am to understand the question of summoning special juries to include the question of the class of persons who are to be summoned, involving the consideration of the qualification and of exemption, I should be prepared to offer an opinion to the Committee. If it is the pleasure of the Committee to exclude that matter, I would make my observations much shorter. Without taking the liberty of offering my opinion upon the question, perhaps I may be allowed to say that, having given some attention to this subject, and read a paper before the Law Amendment Society some years ago, the society did me the honour very recently to ask me to act as chairman of a committee which was summoned to consider the whole question of trial by jury; and after sitting for some weeks, and examining witnesses of great intelligence and great experience, hearing that this Committee was appointed, we agreed to make a separate report upon those matters which we thought came within the Reference to the present Committee. I will take the liberty of presenting that report to you as a part of my evidence, if I am directed by the Committee to do so.—(*The same was handed in.* Vide *Appendix.*)

289. Perhaps you could kindly give us the heads, or in a short form the substance of that paper; first with regard to whatever defects there may be in the mode of summoning special juries, and next as to what remedy should be adopted in order to make that mode fair and just, and likely to work well for all parties?—I am strongly of opinion, and the committee who were acting with me, agreed that it would be a very desirable thing to alter the law relating to the qualification of jurymen. The Committee are aware that the qualification of jurymen (and that term really includes special jurymen as well as common jurymen and grand jurymen too. The proper word is "jurymen," and the other words have merely been added to express a particular class of persons) is prescribed by an Act of Parliament, and one not of a very ancient date, namely the 6 Geo. 4, c. 50. The qualification now by law prescribed for jurymen as a class is, that within all the counties of England except Middlesex, the person should be a freeholder of 10*l.* a year, or that he should be an occupier of 20*l.* a year. Within Middlesex the occupation must be 30*l.* a year.

290. Rateable value, is it not?—Yes. Then there is something more in the Act, which is not very important, about a house with 15 windows, which is really too minute to notice. Then, deviating altogether from these rules, in Wales three-fifths of the English qualification suffices; so that in the Principality of Wales and on the circuit to which I have the honour to belong, we have the misfortune to have a worse class of jurymen than you have in England; and that accounts, perhaps, for the number of bad verdicts that we get there and the small number of causes that are brought there. The qualification, then, being general by law for all jurymen, the classification into special jurymen and grand jurymen, from the general jurors' book, is an act of the the sheriff and his officers, and it is done in this way. The Jury Act requires the parish officers and overseers every year to make out a list of the persons within the parish or township qualified by law to act as jurymen, and they must add to the description in the list the addition of the title and so forth, of the person. The lists being so made out, when they are completed in the insufficient manner to which I shall presently direct the Committee's attention, they go, with those additions, &c., to

their ultimate place of keeping, the sheriff's office, and there the sheriff's officers, the under-sheriff and his subalterns, have from them to make out a list of the grand jury and a list of the special jury. So that, if it is a juryman's pleasure to be turned into a special juryman, if he can get himself so described by favour or by money as to answer the legal description of a special juryman, though he may not be an esquire, a banker, or a merchant, "S." is marked against him, and he is entered in the subsequently made-out special jury list. The special jury list is not (the Committee will remember) a list which is an additional list to the common jury list, because they are all in the jurors' book, special, grand, and common jurymen. But, taken out of the jurors' book is a separate list, composed of those persons whose names have "S." after them, for the purpose of that special list. And then on the right-hand page, though the persons may not answer the description of special jurymen, the letter "G." suffices to mark them for grand jurymen. And from the evidence which our committee have had, and from the inquiries which I have made elsewhere I am satisfied that this course is pursued. Persons, in some parts of the country, and in some parts of this metropolis, wishing not to serve upon a special jury, take care that they are so described in the parish officers' list, and subsequently in the jurors' book, as to make them neither esquires, bankers, nor merchants. But they continue to be described as spirit merchants, or as hop merchants, or whatever it may be, and that description prevents their acting, or rather their being called upon to act on the special juries; but as they have "G." put opposite their names, that excuses them from being called upon to act on common juries. They get their names left out of the special jury list, and they get excused from serving on common juries. Now, we were told by Mr. Avery, of the Central Criminal Court, that he had seen persons acting on the grand jury, at the Old Bailey, who, he knew, were gentlemen's butlers and gentlemen's footmen, whose wives kept small shops, and, in some way, getting themselves described as spirit merchants, or coal merchants, and so on, they would, in that way, be on the grand jury of the county of Middlesex. Now, the Act of Parliament, of Geo. 4, c. 50, fixes the amount which forms the qualification for jurymen, as I have already named to the Committee.

291. £. 30. rateable value in Middlesex? — Yes; and 20 *l.* elsewhere, or 10 *l.* freehold, or long leasehold. That is by the Jury Act, which itself consolidated about 43 or 50 Acts of Parliament previously in force. The Acts of Parliament, which were consolidated by that Act, go back to a very early period indeed, and it is a curious thing that those ancient Acts of Parliament fixed also a property qualification for every juryman as the lowest qualification on which a person could act as a juryman in any case. The sum fixed for the county jurymen, in 1415, was 40 *s.* a year freehold, and in 1585, 4 *l.* a year, a very considerable qualification. I think it will require no very great consideration for the Committee to be convinced that that sum, in its present value, would be equivalent to about 150 *l.* a year, at the very least. A substantial 40 *s.* freeholder, of the 15th century, would certainly be equal to a substantial farmer of the present time at 150 *l.* or 200 *l.* a year. Therefore that has been a retrograde movement altogether with reference to the qualification of a juryman; and there is the very high opinion of Sir William Blackstone, to the effect that it was to *the very great debasement* of juries that the present qualification was fixed. It is really a very important thing to consider the question of the qualification of the ordinary juryman, when we come to consider the number of complaints made and the great importance attached to the trial by special jury. I believe that if a proper provision took place as to the qualification of the common juryman, the ordinary juryman, the resort to a special jury would be very infrequent indeed. The special jury was only called into existence in its present shape about a century and a quarter ago. Up to 1730 the only special jury known was a jury of freeholders, directed by the judges, on a trial at bar, at Westminster Hall, taken out of the jurors' book, but taken simply from the freeholders, no higher qualification whatever being fixed, and no other qualification or restriction than that the juryman should be a freeholder. The 3 Geo. 2, c. 25, authorised special juries on ordinary issues, but the practice of selecting the freeholders remained in force till 1825; the 6th of Geo. 4, c. 50, in its provision with regard to the Special Jury List, has introduced all the evils, as I believe, that we are now suffering from. And the suggestion that I would take the liberty to make to the Committee, in regard to that, would be that they should consider whether or not it would be expedient to raise the qualification of the ordinary juryman, and to restrict the cases in which special juries are called upon. Now, with regard to the exemptions: when a person has been on the list, and is otherwise qualified, he is exempt if he is above the age of 60.

292. Mr. *Brett.*] All jurymen?—All jurymen above the age of 60; and he is exempt if he answers any one of the descriptions contained in the very lengthy section containing the list of exemptions.

293. *Chairman.*] Have you that list of exemptions?—I think I have a short list of them; they are given in the 5th section, and they include peers, judges, clergymen, priests of the Roman Catholic faith, teachers, and preachers in congregations of Protestant Dissenters, subject to certain qualifications, serjeants, and barristers-at-law, doctors of law, advocates of civil law, attorneys, solicitors, proctors, officers of courts of justice, coroners, and gaolers, physicians, surgeons, apothecaries, officers on full pay, pilots, masters of vessels in service of Trinity House, the Queen's household servants, officers of Customs and Excise, sheriffs officers, high constables and parish clerks, persons exempt by prescription, charter, grant, or writ (except burgesses), police magistrates and their servants, Commissioners of Property and Income Tax, and Commissioners and officers of Customs, and clerks under them. The Committee will observe that the persons exempt include the representatives of all the educated classes in England; they really include the larger proportion of the educated classes, all the learned professions, and a great number of other persons of presumed station in life and good education. It is a singular thing that this Act of 6 Geo. 4 was passed before the Jewish Emancipation; and whilst a grocer or a greengrocer who happens to be a teacher or preacher in a congregation of Protestant Dissenters is exempt by law, the Chief Rabbi of the Jews would not be exempt. It is rather a hard

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hard thing upon the Jews that they are not recognised in this Act, and that the Chief Rabbi might be called upon to serve upon a common jury if he were a householder. I would venture to suggest to the Committee whether it would not be worth while to consider in what way the abuses of this claim of exemption might be met. Whilst this Act of Parliament limits the claim of exemption to those actually in practice, there cannot be a doubt that at least one half of the persons are merely colourably in practice. I say it with every respect for the profession to which I have the honour to belong. I think it would be of very great service to the community, and of service to themselves, if one half of the gentlemen who have been called to the bar were occasionally to serve in the jury box. They certainly are not practising barristers in the honest and fair sense of the term, and I cannot help thinking that it would be no disadvantage to them, and they would become better citizens, serving on juries. If, again, clergymen and priests of the Roman Catholic faith, and teachers and preachers in congregations of Protestant Dissenters, were also put in the jury box, it would teach them their duty towards their neighbours, as practically as they teach us our duty towards God. I may not go through the list in detail, but I certainly think that whatever view the Committee may take upon the subject of the principle of exemption, the abuse of the exemption should be met by some stringent provisions. It should be confined, at all events, to those who can legitimately claim it, through being actually in practice or actually engaged. I should suggest that in lieu of these exemptions being permanent, temporary exemption should be given at the time of the revision of the list. I will mention here one evil to which my attention was called by a very eminent authority who acted on our committee, Mr. Greaves, who complained of it very much; namely, that under this Jury Act the exemption on account of age of men above 60 has been the cause of a very serious litigation. The Jury Act defines the persons who are qualified and liable to serve as jurymen; and I believe it is an Irish case in which the question that I refer to has arisen (and the question is still pending), whether that objection on the ground of age was a legal disqualification to the juror, and therefore one that might be the ground of challenge, or whether it is a personal objection, and one which it rests entirely with the juryman to take advantage of, or not. Certainly, in dealing with this matter, and legislating upon it, provision should be made for the future, either to make it a mere personal exemption, or that it shall be a personal disqualification. Now, upon this subject of qualification (before I go to the subject of making out the list) I am very decidedly of opinion, and the committee that I acted with, of the Law Amendment Society, also unanimously agreed with me, that very strong provisions should be made to exclude from the jury box every person of bad character. The law at present disqualifies from serving as a juryman a person convicted of felony, or of any crime infamous in itself. Now there is not a member of the Committee who does not know that there are a mass of crimes, samples of which we unfortunately have seen too frequently, which are in no way included in either of those definitions. There is a mass of misdemeanours which are of a very serious kind, and there are many offences which render a man wholly unfit to tak any part in the administration of justice, whic yet are not felonies, and are not by law infamou in themselves.

294. *Chairman.*] Are the crimes which exclude a man specified in the Act?—Yes, th 6th of George 4 says, conviction of treaso or felony, or of any crime infamous in itsel The suggestion, which the committee, I wa acting with, have made in that paper, which have handed in, is, that in future the disqualification for a juryman should be, that he had bee convicted of any crime or fraud.

295. Mr. *Brett.*] You use the word "convicted?"—Yes; convicted of any crime or frau I suggest that as a substitute for the provisio of the 6th of George the 4th, deliberately. find in the records of a very old corporatio that is represented on the Committee on th present occasion, the Corporation of London, tha one of the Standing Orders excludes from offic in the corporation any person convicted crime or fraud. It is very much to their credi and very much to the public advantage.

296. Mr. Alderman *Lusk.*] Or of bankruptcy —Yes. I do not suggest that in this case.

297. *Chairman.*] Might I ask, not being lawyer, what class of offences would come unde the category of crime?—It would include ever offence that is of a criminal character.

298. An aggravated assault, would that com under the head of crime?—I think that if man was convicted of an aggravated assault h had much better not be in the jury box.

299. Mr. *Huddleston.*] Can you mention an conviction for a criminal offence, which is n infamous in itself, or rather any criminal offenc which is not infamous in itself?—I think I quit agree with the honourable and learned Member that the conviction of any crime has a degree of infamy about it, but the description the offences in the 6th of George the 4th, is tha they must be crimes which carry infamy as par of the punishment, which disqualify from bein witnesses, and so forth, or which did previous t the alteration of the law disqualify from bein witnesses; therefore the words have a technical and narrow meaning, as the honourabl and learned Member knows.

300. Mr. *Freshfield.*] Might you not sa "convicted" of any felony or misdemeanour?— Any felony, misdemeanour, or fraud—a person for instance, coming up before the Court o Bankruptcy, and who has embezzled his creditors' money, is distinctly guilty of fraud.

301. Mr. *Huddleston.*] You would not sa "convicted of any offence"?—No, I think not.

302. Mr. *Headlam.*] You do not mean, do you, to include a man against whom a decree of the Court of Chancery has been made?—No; I merely wanted to draw the Committee's attention to the matter; we are not drawing the clause now, and it is only a suggestion of mine that the objection should be made to embrace every case of a man convicted of crime, every criminal, although he may not be a felon.

303. Mr. *Huddleston.*] "Convicted of crime or fraud," you would suggest?—Yes. It has worked well, I believe in the Corporation of London, an institution to which I have paid some attention; and the old-fashioned expression is, as I have put it: "Convicted of any crime or fraud." The next matter that I would call the Committee's attention to is, the mode in which the lists are now made

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made out; and my simple proposition upon that head is, that the making out and completing the jury list, the jurors' book, should be assimilated to the practice and the law in making out and completing the voters' lists, and the register made from those lists.

304. Mr. *Brett.*] The Parliamentary lists, you mean?—Yes, the Parliamentary lists. Now the course taken, as all the Committee know, with the voters' lists is this, that on a certain day, just about this time of the year, a notice is sent out to all persons who have claims to vote in respect to the county register, and the lists both of the borough and of the county are made out a few weeks afterwards; those lists being published in the prescribed manner, by being put on the church doors. Every one who is interested in the matter has the opportunity of objecting, and a month afterwards the list of objections which have come in in the meantime is also published. There therefore is a complete publication of the persons who are invested with the elective franchise, and of the objections to those persons, and of the claims of those who have been excluded; there are sufficient lists which it is in the power of everybody interested in the matter to see made out correctly. And when all that has been gone through, and a sufficient publication has taken place, those lists are completed afterwards by a system of revision by the officer appointed, namely, the revising barrister. Now in the case of the jurors' list a wholly opposite system takes place. The Act of Parliament directs the overseers and churchwardens of every parish each year to make out a list of persons within their parish qualified and liable to serve. The lists so made out are extremely defective, and for a very good reason, they have no machinery for setting them right in the first instance; but they can only take the statement made voluntarily by the person to whom they go as to whether that person is qualified, or whether he is exempt; whether, in fact, his name should be in the list or not; and they are also at his mercy as to how he shall be described. Therefore, instead of being a compulsory list, as the voters' list is, made by the direction of the law, it is but a volunteer list made out by the united action of the person interested in deceiving the overseer, and by the overseer who is deceived.

305. *Chairman.*] May I interrupt you to ask whether the persons described send in a description of themselves, or is it left to the overseers and churchwardens to describe them?—Your Lordship, for instance, I believe, is residing in Westminster. I believe that the custom in the metropolis in those large parishes is to send out a notice to each house, and in that way the information comes direct from the householder; in all probability it is often made out by a gentleman's servant.

306. I have lived seven years in that parish, and never received a notice of that kind, and that made me ask the question?—I have lived many years in Paddington, and have always found a list left which I was required to fill up.

307. Another honourable Member of the Committee says that he, also residing in Westminster, has never received a notice of that kind?—There is no legal obligation to send it; it is only for the convenience of the parish officers. The parish officers, unless they are assisted by the voluntary acts of the householders, make out the list for themselves, and of course they take care to put the best information they can get about persons in the jurors' lists; they describe them as they can from the information which they get from the man himself, or they describe him as esquire or merchant, just as the humour strikes them. That is the case all over England and Wales, I believe, except in the exempted and privileged portion of this metropolis which is called the City of London, and there the alderman of the ward, and the six or seven common councilmen of the ward, and the ward clerk (and I suppose the ward beadle), between themselves, in secret conclave, make out the list. It certainly is a remarkable thing (I will not betray the confidence of any of the civic officials who have given information before us, but it is a most remarkable thing) that you never find a common councilman in the list described in such a manner as to require him to serve on the common jury; and whilst the qualification for a man being on the special jury is that he must be an esquire, a banker, or a merchant, it certainly appears to me, from the information which I have been able to gather, that a very, very small proportion of the common councilmen answer to either of those descriptions. They are neither bankers, merchants, nor esquires. That is a mere observation to be made upon the system. In the City the lists, therefore, are made out practically without publication, because they are not published in such a manner as to be rectified by means of their being published on the church doors.

308. Are they published in the other metropolitan parishes?—They are published on the church doors, but in the City of London the lists are commenced and completed by the body that I speak of, the alderman of the ward, and the common councilmen of the ward, assisted by the ward clerk and the beadle; they begin and complete the list. Out of the City, and throughout the rest of the kingdom, the lists having been so made out, as I have already described by the parish officers, and having been published on the church doors, and such objections that may be made by volunteers being made, they come before the justices assembled at petty sessions in September, the very time when the revising barrister for the district is holding his court, and the lists are handed in and signed. I say, without hesitation, that the practice is so throughout all this country; the lists are handed in to the magistrates assembled at the petty sessions; no revision whatever takes place; they are signed as a matter of form, with all their defects upon them, and the revision is a mere farce.

309. Mr. *Whatman.*] I beg your pardon for interrupting you, but in the division in which I act, the county of Kent, the magistrates always do revise them?—I apologise most sincerely for having made such a sweeping observation when I am only speaking from my own experience.

310. *Chairman.*] The practice ought to be, you think, as we hear it is in Kent?—The practice ought to be as it is in Kent.

311. In law, ought the lists to be revised?—They ought.

312. Does the law provide for the accurate and systematic provision of them?—The law does not sufficiently provide machinery for correcting the list.

313. But it contemplates revision taking place?—It

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—It does; and that revision which is provided for does not take place.

314. In your opinion, the machinery provided is not adequate for a proper revision?—No. Now in the revision of the voters' lists there is always a supposed strong interest, caused by the party feeling prevailing in the district, to secure a fair revision of the lists; the Conservative agent appears on one side, and the Liberal agent on the other, and they keep a watch upon each other. It has been said, with some justice, that in the case of the jurors' list there would be no provision for such a watch being placed upon the list as to follow up objections, or even to make them. The suggestion which I would venture to make (and I am in some way borne out in this by the report which I have handed in) is, that some responsible officer should be empowered to see that the names put in by the overseers are correctly put in and correctly described, and that the list does contain all the persons in the parish who ought to be on that list; that, in fact, the list is complete. I would suggest as a proper officer the chief officer of police. But who the person should be would be matter for future consideration; the principle which I would recommend is that some responsible person should be appointed to see that the lists are properly made out, and that the overseers do their duty. I would impose penalties upon the overseers for neglecting their duty in any way; and I would, on the other hand, give the court of revision the power which it does exercise with regard to the voters' lists, of remunerating the overseers and those who are employed in making out the jury lists, and certainly of remunerating the officer of the district, the police officer, or whoever it may be, for making those lists complete. The list, when it is being revised and entered into the jurors' book, should be so arranged as to include the persons only who have to serve for the next year, excluding those who have served the year before, or putting them at the end of the list. In fact, I would propose that the rota which has been referred to by Mr. Erle in his evidence, should be settled at this court of revision; it would be very easy and practicable to do it. If a rota were established for all the persons qualified to serve on juries, the call upon each man in his turn would be very trifling indeed throughout England; it might be expected that very few men would be called upon to serve more than perhaps once in five or six years; and if a limit were prescribed to the length of service, say three days or six days, or whatever time might be fixed (that time being also a matter of detail to be left in the discretion of the Revision Court) the burthen upon each person then called upon to serve as jurymen would be very small, and the gain to the public would be very great. I certainly should hope that after a revision of our jury system, by weeding the jury lists of objectionable persons, by raising the status and the property qualification, and getting rid of the exemptions which prevent so many educated persons from serving on juries, it would rarely be the case that it would be necessary to have anything but the ordinary jury of the county; the jury directed by the law and constitution of England to try issues of fact, and that that exception, that in some degree objectionable exception, the special jury would be rarely required. The special jury, as the Committee are aware, cannot be resorted to in an ordinary criminal case, but in an ordinary criminal case a man, whatever his station in life is, stands at the bar of the criminal court to take his trial in the ordinary form. Even if it be a question intimately and immediately affecting the interests of shopkeepers, a charge, false or right, of shoplifting, he must, by the law, if he is in a borough, be tried by a jury of 12 shopkeepers. That does appear a very harsh and very unjust thing, and I should suggest that the judge, any judge at Westminster Hall, should be empowered to order a special jury in an ordinary criminal case.

315. What do you mean by "ordinary cases"?—Any criminal case, the defect being as I have stated, under ordinary circumstances, that it cannot be tried by a special jury. In an extraordinary case, an application is made to one of the Courts in Westminster Hall to have it removed to the civil side, that is to say, removed into the Court of Queen's Bench by *certiorari*; and there it can be tried by special jury. I am in hopes that, as the result of a proper revision of the jury list, and importing into the jurors' book the better educated classes, together with the ordinary persons who now serve as jurors, it would be rarely necessary to apply for a special jury at all; and certainly there would not be that outcry that there now is, that a person in a higher class of life than the ordinary run of criminals, does not run a chance of having a fair trial, where the case is tried without being removed by *certiorari.* One great point that has been the subject of complaint, and very deservedly so, is that of remunerating jurymen; and I cannot see upon what principle gentlemen who get themselves designated as special jurymen can complain, and complain so loudly, of their time being sacrificed, and their being occasionally called upon to serve, when the poor shopkeeper, the poor artisan, or the poor farmer is taken away from his business, which so exclusively depends upon his personal exertions, and his remuneration made a sort of mockery. I would propose that the jurymen in every case should be remunerated, and that the remuneration should be according to a scale. We remunerate our witnesses according to a scale, both in criminal and civil cases, and I would remunerate the jurymen in civil and criminal cases according to a scale; and those who were discontented with it might make it a present to the fund, if they are dissatisfied with it. Payment would not be always claimed; there are many persons who come as witnesses in criminal cases who do not condescend to receive remuneration; such refusal is of course perfectly right. Establishing a scale of remuneration would get rid of that grumbling which we now hear so much of. The remuneration I would make depend upon the man's actual attendance. I would require that every juryman should enter his attendance half an hour or an hour before the cause is called on; that upon his entering his attendance, he should be entitled to his remuneration for his service, according to the scale only, upon his completing his three or five days prescribed term of service; and at the end of that time he should be entitled to remuneration, and that remuneration should come out of the county or borough rates. I would direct that every person who did not so attend should be fined a fixed sum, and that that sum should go into the borough or county rate. It might form or not, as the county treasurer was directed, a separate fund, called the Jurors' Fund; but in any case it should

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should be a fund appropriated to the remuneration of jurymen. I would direct that in civil cases the litigant, who has now to pay, should pay for each case as he does now; that is to say, that he should pay fees for the jury, and that those fees should go into the general fund; I would direct also (and I think that this is a very important matter for the Committee to consider) that in those frequently occurring cases where the parties and their attorneys have capriciously or wrongfully shifted the venue, getting a London case to be tried at York, or a Surrey case to be tried at Liverpool, they should in every case pay double, and the jury expenses should be paid into the fund in the same way. I believe that those are the principal points that I need call the Committee's attention to, the qualification being prescribed by law; and particularly I am reminded by a suggestion of Mr. Greaves, the qualification of the grand jurymen, as well as the petty jurymen and special jurymen, should be fixed by law.

316. You propose that the qualification for a juryman should be raised; you think it is too low at present?—I think it is too low.

317. Have you at all thought to what amount it should be raised?—I should say that 100*l.* a year, derived from any source, should be the qualification; that any one who could be proved to be in the possession of 100*l.* a year should be qualified for a juryman.

318. Then you would do away with the classification; you would have no distinction made between the special juryman, the common juryman, and the grand juryman?—Yes, I would; the special juryman should have a higher qualification.

319. How much higher should you suggest that the qualification for a special juryman should be?—I would always have a special qualification for special jurymen, *e. g.*, a merchant or banker for a special juryman in a commercial case, scientific men for patent cases, &c.

320. In regard to exemptions, I think we may gather, from remarks which you have made, that you think the exceptions now very much too large; that they embrace a class who ought not to be exempt?—Yes.

321. What exemptions would you propose to retain, and what do you think right to abolish; first, with regard to age, do you think 60 too early an age for a man to be exempted from serving on juries or not?—My own personal opinion is, that 60 is too early an age; but any way I would allow it as a privilege to the person himself to claim exemption, if he pleases; it should be the duty of the parish officer to put his name down.

322. For instance, an infirm man of 60 might claim to be exempted, when a hale and hearty man of 60 might serve?—Yes.

323. You would allow age to serve as an exemption, and sickness or bodily infirmity, I suppose?—Yes.

324. What classes at present coming under the exemptions should serve; I think you said all ministers of religion?—I would admit all ministers of religion.

325. And professional men and learned men?—Yes. I think that any one of the three professions should be entitled to claim exemption at the proper office for a definite period. That a man might claim exemption, for instance, as being actually engaged at the sittings of Nisi Prius as a lawyer.

326. And bound to assign a cause for so claiming exemption?—Bound to assign a cause.

327. With regard to the revision of the lists, I do not think that you told us the time of year that the lists are made out?—They are made out in July and revised in September. I think that the time should be made to accord completely with the voters' lists. The voters' lists are revised in the months of September and October.

328. Would you suggest that any one who claimed exemption as a juryman should be bound to apply personally or in writing before the revising barrister, and that, not doing so, he should remain on the list?—I would certainly not require his personal attendance, but that some evidence satisfactory to the mind of the revising court should be adduced before he was exempted.

329. Do you consider that at present the way in which the public notices are affixed on church doors, of persons liable to serve on juries, is sufficient?—If the lists were properly made out they are sufficient.

330. I think you agree with Mr. Erle that one general rota for all the courts would be an improvement upon the present system?—Yes.

331. And one general panel to try all the causes brought before the superior courts?—Yes.

332. With regard to the remuneration, it should be done according to a scale, you think?—Yes, assimilating it to the allowance in the case of witnesses.

333. Do you mean with reference to the position of the jurymen, their professional engagements and other circumstances being taken into account?—Yes.

334. And you think that the fund should come out of the borough or county rates?—Yes; the county rate should be burthened with it first. The litigant should be taxed as he is now; and what the litigant pays and what is received in the shape of penalties should go to the borough or county rates to recoup them.

335. At the present moment it is paid by the unsuccessful suitor, is it not?—In civil cases by the suitor; but in criminal cases a man gets nothing.

336. I suppose you think that the system of a juryman being summoned to serve in four or five different courts at the same time is a faulty system, and ought to be remedied?—Yes.

337. And that it would be remedied by one general *rota* being established?—Yes.

338. I understand that at the present time the notice served upon gentlemen who have to serve as jurymen is very insufficient; I believe only 12 or 24 hours' notice is given; that, in your opinion, is wholly insufficient, is it not?—Wholly insufficient; I would have a more responsible person, duly paid, for summoning the jurymen, and a prescribed notice should be given, say three days at the very least.

339. You think that that would be sufficient, and that then there should be no excuse given on the ground of insufficient length of notice?—In ordinary cases it would be sufficient. In extraordinary cases, where the man was abroad, the associate or officer of the court should be satisfied of the fact.

340. I mentioned my own case, that I, living in Westminster, had never received any notice; do I rightly understand that, properly speaking,

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a notice ought to be sent to every man?—Not legally; that is a mere matter of the convenience of the parish officers.

341. Do you think that it ought to be so?—I should hesitate to make it a thing which must be done by law; I should throw the duty upon the overseers of making out the list the best way they can, the same as they are directed to do in the case of voters.

342. If they make out the list and do not allow the persons whom they put on it to know anything about it, can that answer the purpose properly?—In order to save themselves trouble, they would make out the jurors' lists in large parishes after the same fashion, though with more care than is used in the metropolitan parishes now.

343. Have you made any calculation of the number of persons who would be liable to serve in Middlesex if the list of special jurymen were properly made out; I believe only 1,800 are now liable?—I believe, if you take the county voters, they are about 15,000. The whole number of persons that serve as jurymen are 300,000 throughout all England and Wales, and in Middlesex there cannot be above 3,000 or 4,000; so that not one-fifth of the persons on the voters' lists are on the jury lists.

344. Mr. *Headlam.*] You would still retain, as I understand, the common jurymen, the special jurymen, and the grand jurymen on the list?—Yes, I would retain them all on the list.

345. What would you make the qualification of a grand juryman?—I have not really considered what should be the exact qualification, but it should be such as would clearly include the best men in the district, and much higher than that for a special juryman.

346. Would you make it the same for the grand jury for the quarter sessions and for the assizes?—Yes.

347. That would not include a large portion of society; it would be a high qualification?—A high qualification. I think that if the qualification for grand jurymen were fixed at that which is prescribed by law as the property qualification of magistrates, that might be sufficient.

348. That is 100 *l.* a year, is it not?—Yes, in land.

349. And you suggest 500 *l.* for a special juryman?—Yes, but I did not suggest that he should be a freeholder. If a grand juryman's qualifications were that of a country magistrate, it would be 100 *l.* a year in land.

350. With respect to all those who had not the qualification for grand jurymen, they would take their place as petty jurymen?—Yes.

351. So that there would be a very material change in the class who now serve on the juries at assizes and quarter sessions?—Yes; there would be a mixture of classes in the jury box, which I sincerely believe would be very beneficial to the public.

352. That would be the alteration with respect to criminal cases; there would be one qualification for jurymen generally higher than the existing one, and another qualification for grand jurymen, somewhere about the qualification now in force for magistrates. The latter would be exempt from serving on petty juries, and all those who did not come up to the rank of grand jurymen would serve equally for the trial of criminal offences and the civil causes?—Yes.

353. With respect to civil causes, would you do away with the practice of parties now in demanding a special jury?—I would limit very much the discretion of the judge in granting a special jury; I would make it always a matter of solemn application, and not a matter of course; and I would lay down certain restrictive rules that should make an appeal to a special jury much more infrequent.

354. Would you make the parties pay any fee for a special jury?—Yes; I can see no reason to alter the rule which exists now as far as taxing the suitor goes, and making him pay for the expense of a special jury, and the amount paid should go into the common fund; and in the instance of foreign cases, cases tried out of their district, I would impose double fees.

355. You would perhaps have the payment made at the time the special jury was ordered, and independently of the fact whether the cause was subsequently tried or not?—I am inclined to think that it would be better to do so, but I have not fully considered that.

356. With respect to any cases not tried as special jury cases, but only as common jury cases, you would not impose any fee upon the litigants for the purpose of remunerating the jury?—No, they are summoned to attend the court, and are bound to attend.

357. The jury in that case would be remunerated out of the jury fund?—Yes.

358. Would you make any distinction as to those marked for juries for particular cases, merchants, for instance, or those supposed to be particularly cognizant of other subjects?—Probably that might be arranged by certain provisions as to having a special jury in the manner contemplated by the Common Law Procedure Act, and striking a special jury differently from the way in which it is done in the ordinary courts in the country; instead of taking them from a panel separately, taking them in a certain order directed by the judge, all being commercial persons, or all of a certain class.

359. I understand you that the special jurymen would not be exempt from serving on common juries?—The merely being on the list should not exempt any one, but the serving on a special jury should exempt a man from serving again on a common jury.

360. So that at the assizes where there are no special jury causes the distinction would be of no consequence; all would serve equally?—All would serve equally.

361. Mr. *Whatman.*] With respect to grand jurymen, would you in the case of the Central Criminal Court require the same qualification for grand jurymen as in the case of other courts?—I think so; the Central Criminal Court includes five large and wealthy counties, and there would be no difficulty in getting grand jurymen.

362. You would require the same qualification of grand jurymen there, and for quarter sessions, and for county assize courts, if I understand you aright?—Yes.

363. And the qualification you would recommend for special jurymen is about 500 *l.* a-year?—It should be a much higher qualification than that for a common juryman. I would rather not fix the actual figure it should be, but it should be higher than that of the common juryman; and I would rather, instead of having a money qualification, fix the station in life of the person; that he should be a professional man or a merchant, and so on.

364. Mr. *Brett.*] I understood you to say that

you would have the qualification of the common juryman to be an income of 100 *l.* a-year?—Yes, from any source.

365. That would very much circumscribe the present list of common jurymen, would it not?—Well, I fancy that there are a very large number of jurymen in the metropolis whose income from every source is over 100 *l.* a-year.

366. But you do not apply it to the metropolis alone?—No, I take the metropolis as an instance only; but, taking the country districts, I should say that 100 *l.* a-year from every source, whether derived by their own exertions or not, would be a qualification that would work well.

367. And you propose that, with the view of raising the class?—I do.

368. Therefore your object would be to circumscribe the class?—To exclude a great many who serve now. But in answer to your question, I feel bound to say that I do not believe the effect would be to diminish the number of persons who would serve. I believe that it would not tend to diminish the number of persons who could be called upon to serve.

369. However, you wish to exclude a class who now do serve?—I want to exclude one class, and to include another.

370. Has there been any general complaint, as far as you are aware, of the incompetence of common juries to decide the questions brought before them?—I certainly have heard that made over and over again; I say it with great deference to you who have had greater experience than I have on the subject.

371. Is not that complaint made by persons who object to trial by jury altogether, and who think that questions of fact should be determined by one competent person who understands the subject?—I think that the fact that the judges so often order cases to be tried by a special jury, is conclusive that the ordinary trial by common jury is unsatisfactory.

372. May it not be satisfactory for one class of causes, and unsatisfactory for another?—My experience in Wales is certainly not in favour of trial by common jury; there have been so many instances of mistrials.

373. Supposing you took it as a matter of income, as you suggest 100 *l.* a year, would it not be very difficult matter of proof to get at that qualification, whereas now the qualification is tangible?—We have no difficulty in getting at the property of persons who pay the income tax. I find from a return which was kindly prepared for me by an officer in the service of the Government in Somerset House, that he put down the number of persons whose income was 100 *l.* a year, in reference to the income tax, and it makes the number 827,000.

374. I could quite understand how you would get the class, but in settling the qualification of juryman you must get at the individual?—He need not say what the maximum or the minimum of his income is, but only answer the question, "Are you worth 100 *l.* a year or not?" You compel every householder to return to the overseer the number of persons worth 100 *l.* a-year in his house, and you would get a good list.

375. As to special jurymen, you would not like to fix any sum for their qualification, only it should be a high class?—Yes, I would rather have a class qualification; that they should all be merchants or professional persons, &c.

376. Why would you have a money qualification for the common jury, and a class qualification for the special jury?—Simply for this reason, that I conceive that a trial by special jury is and ought to be an exceptional mode of trial, and ought only to be adopted because a special class of persons are required to be in the jury box.

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377. Do you think that the persons you suggest, those who had not less than 100 *l.* a year, would be the persons who could properly try complicated mercantile cases, the class of cases which now go to a special jury?—I should say that they would try them quite as well as they are ordinarily tried now. We know that in a number of cases there is not the full number of special jurymen, but a tales is continually prayed.

378. As to making the list, you would have the list first made out by the overseer on his responsibility?—Yes.

379. And then placed on the church doors?—Yes.

380. And then there should be a public objector, I think, you propose?—Yes, a police officer, or some one whose duty it should be to keep a watch on the overseer.

381. You mean that there should be a public objector, because you say that there would be no interest on the part of the community to interfere in the matter?—Yes; but I would give perfect power, the same as there is in the voters' list, to any one who is on the jury list to object to the list as imperfect.

382. Would the person who is to be this kind of public objector have the power of objecting that certain persons were not on the list who ought to be on it?—Yes.

383. What means would a police officer, whom you suggest for that purpose, have of knowing the persons who were not on the list, and ought to be on it?—As keeping a watch over persons in the district, he would be likely to be a useful check. I am not strong, however, in favour of a police officer for the purpose; but it should be some one in a responsible public position.

384. The expenses he would be put to in making these objections, you would have met out of the county rates?—Yes, or borough rates.

385. Has there not been a great objection amongst the people in the counties to putting any further burthen on the county rates; is not there a great objection to the amount that is already put upon them?—That is a matter of county finance, which I would not like to enter upon. I suggest that it would be a prudent and economical arrangement.

386. I understand you that on objections being raised, you would have the matter adjudicated upon by a barrister?—By the revision court.

387. Would you put it in the hands of the parliamentary revising barrister?—Yes, I would have the jurors' list revised at the same period as the voters' list.

388. And by the same person?—Yes, by the same person. The lists, and the reasons for objecting to those lists, having come before him at the same time, the materials for deciding those questions would be brought before him also at the same time.

389. Should you propose that the Parliamentary voters' list and the jurors' lists should be the same?—No; because it has pleased Parliament in its wisdom to lower the franchise, and it would not

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not be expedient to lower the qualification for jurors.

390. You would keep the qualification of jurymen higher than the proposed qualification of voters?—Decidedly so.

391. The list being made out, you say you would agree with Mr. Erle that there should be a certain number of jurymen summoned at every assizes, or at every sitting in London?—Yes.

392. And that persons who had been once called upon to serve should not be called upon again till their turn came?—Certainly.

393. It has struck me that if you did that, you would make out the whole list anew every year, would not that be so?—If the list is revised, the jurors' book must be a complete book each year, but the end of the book would be for those people who would last have to be called, and they would be the men who had served in the previous year.

394. And you agree in thinking that whatever else is done, at all events it would be a great point if the special jurymen and common jurymen were both summoned in the same way?—Certainly throughout the country.

395. That being so, I think it follows that you would get rid of the difficulty of summoning people upon such short notice, because, if they are to be summoned from a *rota,* they could be summoned a fortnight beforehand?—Clearly; and that would be one great advantage of the system.

396. As to paying the jurymen, do you think that all jurymen ought to be paid, or that no jurymen ought to be paid?—I think that all jurymen ought to be paid.

397. According to the number of days that they are in actual service?—Yes; the payments to be equivalent to a man's expenses, and not such as for him to make a profit.

398. Have you considered at all the kind of scale that you would recommend; you would recommend, as I understand you, the subsistence of the man for the day?—Yes, a reasonable subsistence, and not much more; there should be a liberal subsistence, but not much more.

399. Then, you do not pay him for his loss of time?—I would not enable him to make a profit; I would give him an indemnity for what he may be considered to have lost by attending; that is to say, what he may reasonably be considered to have lost.

400. And you would make no difference, as I understand you, in the class of jurymen, or in the qualification of jurymen, to serve at the assizes or in counties, or quarter sessions or boroughs?—No; I would have only one. The only exception I would make, from necessity, would be the case of the inquest jury, because in a coroner's jury you are bound to have the first people you can catch.

401. You spoke of exemptions; for instance, in our profession you said that you would restrict the exemption of barristers, and, as I understand you, you would make it dependent upon whether they were in practice or not?—Yes.

402. Is not that a very difficult point to determine?—I do not think that, practically, invidious questions would arise. I think that if a gentleman called himself a barrister, and he merely was a country gentleman after all, he would be put on the list, and it would be very rarely that there would be a squabble about it.

403. You do not mean to distinguish between those barristers who get more or less practice?—No, certainly not. If a man was habitually at Westminster Hall or on circuit, he might fairly be considered a practising barrister, and the same with attorneys.

404. As to professional gentlemen: as to medical men, for instance, is not the ground upon which they are exempted, the ground of public policy, that their time is really wanted to attend the sick?—It is all put upon the ground of public policy. In the case of the attorneys, the old law provided that they were exempt, not upon the ground that they were engaged for their clients, but that they were officers of the courts at Westminster.

405. Would you summon a medical gentleman with a great practice to serve on juries?—I would have him take his turn.

406. Then, as to the clergy; supposing that a Roman Catholic priest is summoned, is not there a difficulty which suggests itself to your mind, that he might have a greater knowledge of the facts than he ought to have?—I have more hesitation on this point, about the ministers of religion, than any other class. It is remarkable that the French Code has the ministers of religion as the only persons exempted from serving on juries, and they are excluded altogether. I may hesitate very much about that; I only draw the Committee's attention to the question of exemption, thinking that it may be very well considered with public advantage.

407. Do not you think that it might lessen the confidence which ought to exist between a spiritual adviser and the person whom he is advising if he might be, after all, on the jury which is to try him?—The same objection may apply to the attorney and client, and may apply, and does apply over and over again, to debtors and creditors.

408. Is not that one of the reasons why attorneys are exempt?—A stronger machinery is at work between the debtor and the creditor than ever between the attorney and the client, and there is no objection by law in the former case.

409. Then you said that you would suggest, by way of clearing the jury list, that there should be a disqualification, as I understand you, of any person who had been convicted of any crime or fraud?—Yes.

410. You mean, of course, convicted upon trial?—Yes, convicted summarily or otherwise.

411. Convicted upon a criminal trial?—Not only upon a criminal law, but if a person had been up before a bankruptcy court and had been convicted of fraud, I would treat that as a disqualification.

412. You have quoted a committee who assisted you; will you tell us the names of the gentlemen who actively assisted you?—Mr. Greaves was a very active member of the committee, and gave valuable assistance; so were Mr. Charles Clarke, Mr. Chisholm Anstey, the Common Serjeant, Mr. H. W. Freeland, Mr. Frederick Hill, and Mr. Rew, of the Northern Circuit. We had constantly large attendance from time to time. We changed from day to day. We had some gentlemen who were not active members, but who gave us aid by suggestions, of very considerable eminence in the profession. We had communications from Sir Roundell Palmer, Mr. Lowe, and from a number of other men of high position, including the late Chief Justice, Sir William Erle. He, I believe, was a member of our committee,

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committee, a non-attending member, but an effective member.

413. Mr. *Denman.*] You also have written a pamphlet upon the subject, have you not?—I read a paper some years ago before the Law Amendment Society, which is out of print.

414. It was printed by them in the shape of a pamphlet?—Yes.

415. Do you happen to have some spare copies?—I will give an order to the secretary to give as many copies as he has, but I am afraid it is out of print. That is the only copy that I have (*handing it in to the Chairman*).

416. You say that you have had evidence taken before that committee of the Law Amendment Society?—Yes.

417. It might possibly be convenient to this Committee if you could give us the names of the gentlemen whom you examined?—You will find at the head of that report which I handed in, the most distinguished men. We had also summoning officers, whose names are not of much value, but I can procure their names if desired.

418. Those summoning officers, I suppose, were persons whose names were given to you by the other witnesses who were superior officers of the under-sheriffs or the under sheriffs themselves?—Yes. I think the summoning officers from the coroner's court.

419. Had you any one from Surrey besides the under-sheriff, Mr. Abbott?—No.

420. You suggest that several persons who are now exempt by law had better not be exempt for the future, in order that there may be a larger selection for jurors, special and common?—Yes.

421. Have you any notion at all, from the evidence that you have seen or otherwise how many persons are exempt on the ground of being commissioners for property and income-tax?—No, I have formed no notion, but I should think a large number.

422. Can you give us any opinion as to the ground upon which this exemption stands, or is it an arbitrary one?—I really cannot say upon what ground it stands.

423. I believe every year Acts of Parliament are passed, adding very largely to the number of land-tax commissioners in every county?—Yes.

424. Are they exempt?—Not the land tax commissioners.

425. Only property and income tax commissioners?—Yes.

426. But they are very numerous?—Very numerous.

427. Many of them do not attend as income tax commissioners, but have other duties to perform?—I cannot say, as I have no knowledge of that Act; it is a very unnecessary exemption, I think.

428. You suggest that the common juries should include the present special jurors?—Yes.

429. That there should be one jurors' list?—Yes, that there should be one jurors' list.

430. And that the man who is now a special juror should be liable to serve on a common jury?—Yes.

431. As I understand you, you do not suggest that there should not be a power of having a special jury in a higher sense?—Certainly not.

432. With regard to the facts you mentioned about the Common Council and the way in which jurymen are summoned by the Common Council or under their auspices, were they facts within your own knowledge in another manner, or facts which were obtained in the examination before the Law Amendment Society?—Partly from the evidence brought before it, and partly from inquiries made by myself.

433. Had you witnesses on the subject?—We had Mr. Potter, the Secondary, who gave us very useful information.

434. If you had one *rota* containing the names of all the special and all the common jurors, and summoned them only, as they had not served before, taking them exactly in rotation from that *rota*, would not you run some risk unless some arrangement were made to the contrary, of having 50 special jurors running, and then 50 common jurors running; must you not do something in order to mix them up?—I think that provision ought to be made to that effect.

435. Probably if you trusted to mere alphabetical arrangement, that would be the result which I have indicated?—If you trusted to mere alphabetical arrangement I think the result would be very objectionable. I would always have the jury chosen from the body of the county, and certainly not alphabetically; or you might have a jury of Joneses coming from different parts of the county and all of the same family.

436. And that in Wales would not answer?—Certainly not.

437. Some arrangement would be necessary in order to avoid summoning a batch of special or a batch of common jurors, by which practically you would have all common or all special jurors?—Yes, you must fuse them.

438. You think it would be desirable, as I understand you, in very special cases to retain a special jury?—Yes; it should be a jury of merchants, or a jury of freeholders, according to the direction of the judge.

439. Colonel *William Stuart.*] Would you make the grand jury qualification a landed one?—It should be a property one. I think that for grand jurymen it would be an advantage to extend the qualification so as to embrace personal property as well as real property; but it should be a high one.

440. Would you exempt a grand juryman from serving on common and special juries?—I would exempt every gentleman who had actually served on the grand jury from being called upon again to serve; but the mere being on the list of grand jurymen should not constitute an exemption.

441. The magistrates sitting in quarter sessions cannot very well serve on the grand jury at the quarter sessions, though at the assizes the grand jurymen are generally magistrates?—Just so.

442. Would you give any gentleman power of serving in one county in preference to another. I know a gentleman who was summoned in the same week in London, in Warwick, and in Bedford; he happened to have property in the one, was resident in the second, and had a house in the third, and so was served in the same week in three places with notices to attend as either a grand juryman or a special juryman?—I certainly would propose that where a gentleman was liable to serve in more than one county he might elect in which county he would serve.

443. You are aware that many gentlemen have houses in London and are also living in the country, and they are summoned in London at

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the very time when they are down in the country; that is a very great inconvenience, is it not?—Yes.

444. Mr. Alderman *Lusk.*] In speaking about the qualification for a juryman, you said you think it should be 100 *l.* income?—Yes, from any source.

445. How are we to get at the qualification of income?—We can only get it from the best information that the parish officers have at their command.

446. Do not you think that it would be better from rental, or from rating?—No; my feeling is strong that we are dependent too much upon the test of rating and rental; there are a great many people who are most useful members of society, who are neither rated nor rented.

447. You think the best thing would be to get at the income, if possible?—Yes; I would include a substantial man, although he had no house, but was a lodger.

448. Common juries now try all criminal cases?—Yes.

449. Do you think that there is any reason why criminal cases, considering that they are exceedingly important, should be tried by common juries, and that civil cases should get special juries?—On the contrary. I think it is an exceedingly hard thing that cases of such vital importance, as those involved in a criminal trial, should be only tried by an inferior order, whilst a dispute in the City of London about 50 *l.* may be tried by a special jury.

450. You think, for example, that a man's life is of more importance than a bill of 50 *l.*?—Yes; and his character still more.

451. What do you think should constitute a special juryman; a particular trade or profession?—I answered that question to the Honourable Member, on the other side, by saying that I would propose that a special jury should be directed by a special order made by the court or the judge. The court might have power to order a special jury of merchants or freeholders. I would not have a mere class of men, whose exclusive test was the possession of money, but I would have the court make an order for a special jury of people correctly described as merchants, for example.

452. Taking juries in that way would put a stop for example to the abuse of asking for a special jury?—The judges' discretion, that great power which they have in awarding costs, is effectual in preventing abuses of that kind.

453. There are a number of people who are sure to ask for special juries?—Yes, they would spend their money in that way.

454. You would put it in the power of the judge entirely?—Yes, to order a special jury, if he thought proper.

455. Then, too, you think that all jurymen should have remuneration?—Yes.

456. By time or how?—I would pay them by their attendance.

457. The time they are occupied?—The time they are in attendance.

458. Looking at the cases now where a special jury is summoned, do not you think that where a man puts a special jury to great inconvenience and trouble to look after him, he should pay a considerable fee to those who come for that purpose?—I quite agree that the parties choosing a special jury ought to be compelled to pay the expenses of the jury at once upon getting the order, and that that money should go into the fund, so that the suitor should have to pay for it; but each juryman would only be paid whether his brains were at work or not, if he attended; he would be paid for every day he attended.

459. Do not you think it would prevent cases being sent to a special jury if a considerable sum had to be paid for a special jury?—I would not fix a restrictive amount.

460. Do not you think that if two men litigate and quarrel, and want somebody to come and settle the matter, they ought to pay a fair sum to those who are to sit there for days, when they might be looking after their own affairs?—That is rather an abstract question, and I would rather decline to answer it; but as regards the payment of juries I would certainly make the litigant pay for a special jury; and I would make both a special juryman and a common juryman claimants upon a common fund for their attendance.

461. You think that the county or borough are to pay those charges?—Yes, in the first instance.

462. Do you think it is fair that the county or borough should pay for other people, because they choose to go to law?—There must be some fund; and I thought it would be better that the machinery of the county treasury should be resorted to than any other.

463. All men at present, I believe, are liable to serve on a common jury, are they not?—All the persons in the jurors' book.

464. You would deal with the qualification for the grand jury in contradistinction with the other two?—I would make the qualification of the grand jury a property one exclusively.

465. Mr. *Charles Wynn.*] You have dealt rather hard measure to the Welsh common juries; may I ask what proportion of common jurymen you would have been able to get in the smaller agricultural counties in Wales if the qualification had been 100 *l.* a year; what number would you have been able to summon at any one of the assizes in the smaller counties?—I am quite aware of the great difficulty there would be, under the present system, in meeting your objection; and my remedy would be one that I am happy to say I have not advocated alone—the consolidation of the counties, so as to make a larger area, particularly in the Principality of Wales; it might prevail with advantage in England, but in Wales it has almost become a necessity to have a central criminal court, to include three or four counties, and summon the juries from that larger area, on the principle of the Central Criminal Court here.

466. But you admit that, working on the present system, you would have great difficulty in getting a jury at all, and that jury would be perpetually summoned, session after session?—It would be quite impracticable.

467. Mr. *Freshfield.*] Would you include artizans who might be in receipt, for instance, if we may conceive the thing, of 100 *l.* a year in the jury box?—I would.

468. Mr. *Huddleston.*] Have you considered the propriety of having juries upon particular subjects, analogous to the Trinity Masters in cases relating to vessels in the Admiralty Court?—I would allow the judge or the court who directed the special jury to give special directions, so that the special jury should be a jury of merchants or freeholders, as in old times, or as the case might be.

469. What number do you propose should be upon the panel in each court?—I would give as many as Mr. Erle has mentioned. I think that you should have 30 summoned on each occasion.

470. That would scarcely do, would it; you must consider that you may have one or two juries locked up, and then a jury sitting, and then you have to account for challenges, and those who do not attend?—There ought to be a large panel, undoubtedly, and there could be no inconvenience in having a large panel.

471. Would you allow a challenge?—I would only allow three peremptory challenges, all the others should be for cause.

472. How would you provide for a view; supposing you take a case at the assizes, and you have your panel there, I imagine you would say that you would select six out of the panel who should be sent to view, and those six should certainly be upon the jury to view the premises?—Yes, those would be matters of detail.

473. Have you considered at all the duration of service of the common jury or mixed jury, as you would make it in Middlesex?—In Middlesex I would propose three or four days at the utmost.

474. You know that now there is very great inconvenience in consequence of their being summoned for the whole time, and men being kept six or eight weeks away from their business?—Yes.

475. Is the inconvenience very great from having no place appropriated to jurymen in waiting?—Very great indeed.

476. Does it not generally happen that the jurymen in waiting get into conversation with the witnesses and litigants in the causes, and form a preconceived opinion of the case?--Yes, and that is most objectionable.

477. You are aware than in France they always summon two distinct juries in criminal cases; there are no juries in civil cases in France; but in criminal cases there are two distinct juries sworn; one sits in the box trying causes, and the other sits in a distinct part of the court?—Yes.

478. Have you considered the question of the want of accommodation to jurymen when sitting; at present an architect who builds a court measures out the smallest possible space that he can put 12 men to sit in, and calls that a jury box; with no convenience for writing, no places to rest their pens upon, and no means of making a note?—I have considered it sufficiently to say that any improvement upon the present system would be an advantage. In the new courts, or in any courts that we may have, it would be a great advantage.

479. About the payment of jurymen's expenses; do you propose that it should be a fixed sum, or that it should vary according to the distance that the juryman has to come; for instance, at the assizes one juryman has to come from one end of the county and stay three or four days, whereas another may be living in the town?—I would pay him on a scale, including mileage, as you do witnesses.

480. One word about the Commissioners of Income Tax; have you had experience, on circuit more especially, to the effect that the class of special jurors has deteriorated very much since the Commissioners of Income Tax have been exempt?—My attention has not been directed to that circumstance; but I have no hesitation in saying that the jurymen are certainly very inferior to what I can remember them.

481. In the Committee that sat, and to which you have referred, had you before you any question about the bribes supposed to be given by jurymen to exempt them from being summoned?—Questions were asked, but we could not get from a single witness who came before us proof of the fact. We had a summoning officer before us who repudiated the charge; but at the same time he had heard that such charges had been made.

482. You have heard that ventilated?—Yes.

483. Do you know, as a matter of practice, that very often at the assizes the associate will select the best class of jurymen to sit in the criminal court, whereas he will send the more unintelligent jurymen, if I may use the expression, into the civil court?—Yes.

484. Upon the principle that if a person wants an intelligent jury in the civil court, he can get the special jury?—Yes.

485. The associate will, for instance, take their names by turn; the man is described as tailor, or hatter, and that sort of thing; and then the other men supposed to be less intelligent are left to go into the civil court?—Yes.

486. *Chairman.*] Reverting to the system that you shadow forth, you really think that it would be a lighter and an easier system for all concerned?—I think so.

487. Mr. *Whatman.*] About the qualifications; at present I understand that gentlemen are summoned who are qualified in more respects than one; that may partially account for their receiving more summonses than one; at any rate, they are qualified in separate places, in consequence of their having premises in different places?—Yes.

488. Would you, under your new system, make them liable to serve in proportion to the number of their qualifications, or would you make it that one personal service should exempt them?—I would make it a personal service once for all, the juryman electing where he should serve at the time of the revision of the lists.

Monday, 1*st July* 1867.

MEMBERS PRESENT:

Mr. Alderman Lusk.
Mr. Alderman Salomons.
Viscount Enfield.
Mr. Freshfield.
Mr. Headlam.
Mr. Huddlestone.
Mr. Hastings Russell.
Mr. Turner.
Mr. Whatman.
Mr. Charles Wynn.

VISCOUNT ENFIELD IN THE CHAIR.

WILLIAM BURCHELL, Esq., called in; and Examined.

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489. *Chairman.*] You are the Under Sheriff for Middlesex, are you not?—The deputy sheriff, strictly speaking.

490. How many years have you held that office?—Nearly 20 years.

491. How is the appointment for it made; is it made by the sheriff?—The appointment of deputy sheriff is made by the under-sheriff; the under-sheriff is appointed by the sheriff, and he (the under-sheriff) appoints the deputy.

492. The under-sheriffs change every year with the sheriffs, do they not?—Yes.

493. The deputy does not?—Not necessarily.

494. Is he re-appointed every year?—Yes.

495. Then that officer might be changed too?—Yes, at the discretion of the sheriff and under-sheriff.

496. You have a colleague in the performance of the duties of your office?—Yes.

497. Mr. Hall is your colleague?—Yes.

498. I dare say you are aware for what object this Committee has been appointed; would you be good enough to state for our information what is the course of proceeding by which jury lists are first made out, and then the mode in which persons who are on the jury lists are summoned to serve?—It is no part of the duty of the sheriff to make up or arrange the jurors' book.

499. That is done by the overseers?—Yes, by the parish officers, and the sheriff has no control or discretion in that matter.

500. Then do I rightly understand you, that the list comes to you without your having any previous knowledge as to the persons who are put on it?—Yes.

501. At what time of the year should the jurors' book be received by you?—The jurors' book should be received the first week in the month of January, and practically it is so.

502. Then we may take it for granted that it is received some time in the month of January?—Yes.

503. Having received that list, what steps do you take in the way of summoning jurors?—That is a rather comprehensive question, because there are various jurors summoned.

504. Would you state for our information what your practice is?—I will begin at special jurors, with the permission of the Committee. Perhaps it would be as well if I were to state the system which now prevails, what are the principal advantages of that system, what its principal defects, and what, in my opinion, would be the best mode of remedying those defects.

505. Will you do so if you please?—The jurors' book is delivered to the sheriff as I have stated, the first week in January, and in that book are contained the names of all persons who are liable to serve as jurors, for the current year. It is the duty of the sheriff, upon the receipt of that book, to extract from it the names of all persons who are therein described, as merchants, esquires, bankers, or persons of higher degree, and to place their names into a separate book, which is called the special jurors' book. Now, I may say, that over the book which is originally delivered to the sheriff, the sheriff has no control; that he is bound under a heavy penalty neither to take a name from it nor to add a name to it. The special jurors' book having been thus created, a ticket is made out, corresponding with each name in the book, and those tickets are placed in a ballot box. A special jury is created in the first instance by Rule of Court; that is to say, if the parties to a cause require a special jury, they take out what is called a Rule, which commands the sheriff to nominate and empannel a jury. It is then their practice to deliver the Rule, or a copy of the Rule, at the sheriff's office. Upon the receipt of that, the sheriff appoints the day and hour, and gives the appointment to the party who issues the Rule. He lodges a copy of the sheriff's appointment upon the opposite party, and they attend at the sheriff's office upon the day and hour named, and the sheriff (of course, when I speak of the sheriff, I mean his clerk), in the presence of both parties draws from the ballot box at random 48 names, which names are read aloud, and both the parties at the dictation of the sheriff write down a list of those names with their addresses and additions. A day is then named by the sheriff for both parties to meet and reduce, as it is called, the jury, and each party strikes out 12 names, reducing the number of 48 to 24. Those 24 names are the panel of jurors who ought, in due course, to try the case; and when the case is fixed by the court, to be heard on a particular day, a notice is sent by the associate of the court to the attorney, and it is his duty thereupon to send a notice to the sheriff, informing him of that fact, and requesting him to summon those 24 persons for the day, and in the cause named. The county of Middlesex is divided for this purpose

into certain districts, to each of which districts an officer is assigned, who is called the summoning officer for that district. Upon the receipt by the sheriff of the reduced panel, and the request to summon it for a particular day, the sheriff makes out his warrant, and delivers a copy of the panel, as far as it applies to the particular district, to each of the summoning officers, commanding them to summon the jurors as directed.

506. How many districts is Middlesex divided into for that purpose?—Into six districts; the whole duty of the summoning officer upon the receipt of that warrant, is to deliver as soon as he conveniently can after the receipt of the warrant, at each of the addresses therein named, a summons, calling upon the party to appear as a juryman in that cause, and at that particular day. That is the system by which special juries for the county of Middlesex are created, and by which they are summoned; now to that system there are certain objections. In the first instance, it must undoubtedly happen, that where a jury is taken by ballot, some names will turn up oftener than others. It also sometimes happens, that a juryman is summoned into more than one court for a particular day, which, of course, is attended with inconvenience both to the juryman, to the court, and to the public. It also, happens, that the panel of jurors, after it has been nominated and reduced, lies in abeyance for a considerable time, it may be from the absence of material witnesses, or from one of those many causes which help to prevent a case coming to a hearing; that is to say, the panel is not made use of; jurors are not summoned it may be for a year, a year and a half, or even as long as two years; the result of that is this, that although at the time when these jurors were nominated, they might have been effective men, that is to say, they might have lived at the addresses described in the jury book at that time; by the time the panelled jurors is called into operation, a great many of these men have gone away, or some of them have turned that rubicon of 60 years, which is the age at which jurymen are exempt, and when they are ultimately called, they are found not to answer to their names, and when the matter is investigated, it is found that the jurymen are not in existence; that is owing to the length of time that sometimes elapses before this panel of jurors is made effective. That is another inconvenience. And the last I will refer to is this: it often happens that the attorneys, either through negligence, or through inadvertence, or perhaps because they wish to settle the case, and negotiations may be going on, fail to give the sheriff notice to summon that panel of jurors till very often even as late as the very day before they are wanted. What is the result? A juryman has delivered at his house, perhaps late in the evening to-day, a summons calling upon him to be at Westminster-hall to-morrow morning at 10 o'clock; and of that the jurors (and in this particular case fairly) loudly complain. At the same time they complain of the wrong party; they complain of the sheriff's officer, whose duty is mechanical, like the sheriff's, who has nothing whatever to do with the matter, but has simply to deliver the summons as he is commanded by the warrant. They complain of him, whereas, in reality, they should complain of the law which puts the sheriff in motion in this particular way. Those are the principal objections which appear to me to exist with regard to the present system. With your Lordship's permission, and the Committees', I will now state what I think are the chief advantages of the present system. To begin with, the jurors, by this system of ballot, are not selected from any particular district, but are taken at random from the whole of the county; the parties have a panel of jurors submitted to them a considerable time before the case is called on, and they have an opportunity of investigating the panel, and of expunging or striking out such names as may be distasteful to them; and now that public companies may be said almost, indeed, to monopolise our courts of law, it is of great advantage that they should have these lists a long time before them, that they may compare them with their lists of shareholders, and so on, and save us the inconvenience of what is called a challenge when the cause is called on. Also, the special jurors are spared continuous daily attendance upon the courts, to which the common jurors are subject, and which, undoubtedly to many of them, especially to merchants in the City of London, would be highly inconvenient, if not, indeed, at times altogether destructive of their business. And to mention that which is more individual to the sheriff, the sheriff is spared that, I call it, most delicate and anxious and responsible duty of selecting the names of the parties who are to be called together to try the most important, sometimes public, questions, at other times private matters, which the special juries are called upon to determine every day in Westminster-hall. Those appear to me to be the chief advantages. I will now suggest, with the permission and approbation of the Committee, such remedies as I think might be provided. I apprehend that it is always the desire of Parliament to retain the advantage of an old system as far as it can, and to improve that part of the machinery which may be found to be wanting; and I would suggest that, if the present system is retained, these alterations should be made. Instead of after a particular jury has been nominated, those tickets being returned, as is now the law, to the box, I would suggest that they should be all exhausted; that is to say, that all the tickets should be drawn from the box, and put aside.

507. You mean the 48?—What I mean is this: supposing that we have 2,000 special jurors instead of after 48 names have been withdrawn from the box, those names being returned to the box as they are now, I should suggest that they should be all taken from the box, and put aside, by the ballot, until the last name is drawn out, and that you should then return them to the box, and begin again. That is what I would suggest with reference to the point, if the ballot system is to be retained.

508. Mr. *Whatman.*] That would be to exhaust the list?—That would be to exhaust the list, so that then every man would take his turn; then I would also suggest that, in the event of a panel of jurors having been nominated and reduced, and not having been made available for a certain time, say two terms, a fresh jury should be nominated, not that that panel should be in abeyance it may be for years until the parties are prepared to go to trial, and then the sheriff be called upon to summon a panel which is in reality worn out, lost by lapse of time, but a fresh panel should be nominated.

509. *Chairman.*] Is it possible that a cause might lie by for two years, and the same panel have to be employed; has that ever happened?

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—When I say two years, I believe that I am not putting an extreme case, but it constantly happens to the extent of twelve months and eighteen months, and in these days you must bear in mind that what with deaths, bankruptcy, removal, railways, taking property, and that love of change of residence which prevails at the present time, it is surprising how soon residences change hands. Those who have to deal with things practically discover how soon residences in the present day in London change hands, and we often find that the panel of to-day 18 months hence will be practically valueless; a great many meanwhile will have died, a great many left, and some will have turned 60 and got their names taken off the book, and then they are surprised to find themselves summoned, and complain of the sheriff, who has no discretion in the matter, because it was the panel originally nominated.

510. What time would you fix after which a fresh panel should be nonimated?—I would fix two terms myself, exclusive of Easter, when there are no juries.

511. Mr. *Turner*.] What would be the practical effect of that?—The practical effect of that would be, that unless these 24 names were made available by a certain time, say six months, a new set of names would have to be taken; and I would further suggest that in the event of the attorneys not delivering to the sheriff within, say, three days of the day appointed for the cause, the panel, with a request to summon, they should be bound to try that cause by a common jury. It happens now that advantage is taken of that to postpone a cause: say nine or ten special jurymen attend; we will say the law is that if either party like to pray what is called a *tales*, the remaining seats of the jury box shall be filled up by common jurymen. It may be that 10 or 11 attend, and that neither party prays a *tales;* they wish to postpone the cause for some reason or other, and the cause is postponed. The result to the jurors is very grievous; these gentlemen who have attended have been brought down on that occasion, and they are brought down again on a subsequent occasion, to try this cause, which ought to have been disposed of in the first instance; therefore I would suggest that, unless the attorney has given the sheriff the panel a certain number of days beforehand, so that the sheriff may be enabled to give the jurors a fair number of days' notice, to prevent inconvenience to them in their business, the cause should then be tried by common jurymen in default of a sufficient number of special jurymen attending; and that would act, to a certain extent, as a penalty upon attorneys, and compel them to give the sheriff as early a notice as they could. I think I have now referred to those matters with reference to special juries which demand attention.

512. *Chairman.*] Will you make a similar statement generally with regard to common juries?—I am afraid that I could hardly, with respect to common juries, give the same sort of statement; the question is so much wider; the fact is, that the common jury system, as far as the sheriff is concerned, works well; and the inconvenience I apprehend with reference to the common jury system is almost exclusively to the jurors who are summoned for six or eight weeks at a time daily in Westminster Hall, and who get nothing for their attendance, and upon them it is very hard; I apprehend that it is not within my scope to go into that subject.

513. Are not the common juries summoned from your office?—Entirely so.

514. Will you tell us how that is done?—For the sittings in the superior common law courts a precept is delivered to the sheriff, commanding the sheriff to summon a sufficient number of common jurors for the trial of all issues in the three courts of common law: one precept is sufficient for the three courts, and upon that we summon 60 common jurymen into each court for the sittings, or until discharged by the court; and we ourselves nominate those jurors; that is to say, the sheriff himself takes the jurors' book and takes such names as he likes.

515. It is not done by ballot, as in the case of special juries?—Not by ballot; the sheriff then puts those names on the panel, sends a warrant to a summoning officer, and commands him simply to summon those people to attend the sittings from day to day.

516. And those names are selected by the sheriff?—By the sheriff.

517. Before the lists are made up and come to your office, you are not at all acquainted with who are, or who are not, put on them?—Not in the least.

518. You simply receive a list from the parochial officers?—We simply receive from the clerk of the peace a book called the jurors' book.

519. And he has received it from the parochial officers, I presume, in the first instance?—He has, I suppose.

520. Have you ever considered the question with reference to exemptions?—Very often.

521. Do you think that they are too numerous, and might be reduced?—I will begin with the chief exemption, which is that on the score of age. I have often thought that 60 is too early an age; if it is a remunerative appointment, or even an appointment where there is no remuneration, but an honourable appointment, I notice that men of 60 years of age and upwards are very glad to accept it; but at the age of 60 they are exempt from service on juries, and I think it is too early.

522. What age should you fix as the period at which exemption should commence?—I would say 65.

523. And with reference to the classes who are exempt, do you think that they are too numerous, and that the number might be reduced with advantage in reference to special jurors?—I think that the exemptions are far too numerous. I think I recognise the little pamphlet in your Lordship's hand; that was my father's writing originally; he printed it to give to jurymen who came to the sheriff's office, and who fancy that we can be of use to them, and that they are not properly dealt with.

524. With regard to the classes mentioned in this little pamphlet, do you think that any of them might be excluded from the exemption?—I will explain it first, in reference to the special jury system: bankers, merchants, esquires, and those of a higher degree, alone are eligible for special jurymen; the result of that is, that our special jurors are very few, because persons return themselves, I apprehend (I may be wrong in that), for the sake of getting off the list (of course I am not speaking officially now, but merely from that information which I pick up), as gentlemen, stock-brokers, druggists, warehousemen, and a variety of other descriptions, and so evade the special juries; and that is how it is

that our special jury list is so scant. If a man is returned as a stock-broker he is not a special juryman; if a man is returned as a gentleman, he is not a special juryman; if he is returned as a warehouseman, as a wharfinger, as a shipbuilder, as a wine merchant, and a variety of other occupations, he is no longer a special juryman; and a great number (I might say, at a guess, thousands) who ought to be on the special jury list are not, owing to mis-return.

525. Can you suggest any improvement which might be adopted with reference to the way in which persons are described, or describe themselves, in order that the list of special jurymen might be increased?—I would suggest that it should not rest with their description at all, other than as a matter of exemption. If a man is exempt as a professional man, or from being over age, or from holding some official position, such exemption must prevail, and he, himself, must state the exemption; but I would suggest that, otherwise, according to the residence he occupies, he should be put upon the special jury book.

526. In what way according to residence?—Supposing, for instance, that a man lives in Russell-square, and is not exempt, I would put that man upon the special jury book; I would assume, from the fact of a man occupying the position of a resident in Russell-square, he was a proper man to be on the special jurors' book, without reference to his returning himself as a gentleman instead of as an esquire. There are very few real legal esquires; not one man in 500 who is called esquire is legally an esquire; anyone returning himself as an esquire is put upon the special jury book, whereas a man returning himself as a gentleman is not; but the mere addition of esquire to our names is a means of description to which we are not by law entitled as a rule.

527. Could not you suggest some better test than the mere fact of the particular locality in which a person resides, of his qualification to be a special or common juryman?—When I spoke of a locality I did not mean a geographical locality, but the fact of a man's inhabiting a house of a certain rental; I took Russell-square as an example merely.

528. Am I to assume that you think that the qualification might be raised for a special juryman?—It must be borne in mind that the qualification depends upon the return. If a man returns himself, for instance, as an esquire, he is eligible for a special jury, but if he returns himself as a gentleman he is not. The same man may return himself as esquire to-day and as gentleman next year; he may learn the system; he may look at the Act of Parliament, and find out what the system is, or his attorney may inform him, and then, to avoid service, instead of returning himself as esquire, he may return himself as gentleman.

529. What is the number in Middlesex of special jurymen?—The number of special jurymen in Middlesex is nominally 1,800; but I think that I am well within the mark when I say that at least one-third of those are inefficient; that is to say, supposing that all the names upon the book were called over at once, I do not believe that two-thirds would answer to their names.

530. And under an improved system, how many do you think would be qualified to act?—I cannot help thinking that, under an improved system, instead of 1,800 names, we ought to have 6,000 or 8,000; and I attribute (and indeed I know in my own mind that I am right in so attributing) to the fact of the few special jurors that we have, all the complaints that have arisen which have, probably, caused this Committee, and not to any breakdown in the system. Those objections to which I have referred, and which have been very few (indeed merely exceptions to the general rule), would not have arisen if we had had a sufficient number of jurors on the book.

531. In what way would you suggest that that number should be increased from 1,800 to 6,000 or 7,000?—By the officers making their return of persons as esquires, and so on, without reference to the return that the parties themselves make. Unless a man can show his exemption from the jury altogether, I would put him upon the special jurors' list if he inhabits a house of a certain rental.

532. Then you think that it is the fault of the parochial authorities that the number of special jurors is so small?—I would not say that it is their fault; I will assume that their duties are equally laborious with those of the sheriff, whose duties I know.

533. You think that there is some defect in the system?—I do not think that it necessarily emanates from them. For instance, I live myself in the parish of Paddington, and I have every year delivered to me a form to fill up, stating my exemption, if I have any, which gives a reference to the Act of Parliament. I fill that form up every year, and I never find myself placed upon the jurors' book. I have no doubt, however, that a great many people neglect to fill that form up and return it to the officers of the parish. The result is, that the officers of the parish are apt to put down the same names over and over again without revision, because the labour of revising those lists as they ought to be revised, must, without the assistance of the public, be something enormous.

534. Have you considered the practicability of a revising court being held specially for those who may be called upon to serve as jurymen?—I cannot say that, until a learned serjeant, the other day, mentioned the matter to me, I had ever considered it, or that I have considered it since sufficiently to be able to inform the Committee upon it.

535. Objections are now heard by justices in petty sessions?—Yes; the system I believe to be this: that in the autumn, or September, the lists are made out, and they are appended to the church doors and some other public buildings, and any person may search a list, and if he finds his name upon the list of jurymen, and he objects to have his name there, he may appeal before the justices, and have his name expunged if he can show cause.

536. I think you have said that there are six districts in Middlesex?—There are six districts in Middlesex.

537. Since when has that division been made?—They have stood for a very long time. There were five; and then, owing to the enlargement of the county some time ago, we added a sixth.

538. When you say "we," whom do you mean?—We in our office. I did it myself a few years ago, owing to the county increasing.

539. Mr. *Whatman.*] With reference to what you have told us, do you see any great impossibility or difficulty in revising the list of the reduced

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duced 24 names chosen for the panel?—I see no possibility of revising that list after it has been nominated and reduced.

540. How do you account for jurymen being summoned to several courts on the same day?—By the system of ballot, the same name may turn up two or three times in the course of a day; it stands to reason that by the ballot the same name may, and of course out of so few jurors as we have the same name does from time to time turn up, to the inconvenience of the juror. I am of opinion, that unless our list of special jurors is very largely multiplied, no suggestion that can be made as to the mode of summoning the jurors can relieve us of the difficulty in which we are placed; the very first thing to consider, and the most important, is to enlarge the list.

541. There is no consultation in any way amongst the parties as to the possibility of these jurymen attending when they are summoned?—No, they cannot have that; it may be that the parties have the opportunity of knowing individually, by reputation, certain jurors, and they may like to leave some on and take some off, which I think advisable.

542. But take the case when a juryman is summoned to serve in several courts on the same day; the object, of course, is to secure his attendance, but there is no supervision apparently to ascertain whether it is possible for the juryman to attend or not?—Each case depends upon itself; the parties in one cause have no knowledge whatever of any other cause, or of any list of jurors that may be empanelled in any other cause; they simply have a list of names submitted to them, and some of those names may be submitted to a third party; they have no communication between themselves.

543. It is all matter of chance whether the jurymen can attend therefore?—Entirely a matter of chance.

544. When the names are returned of those who are liable to serve as jurymen, is there no inspection of that list, so as to check the description when the lists are delivered to the magistrate or the justices in petty sessions?—After the lists are made up, they are published; and it is the duty of the public, if any individual juryman who wishes to be excused from service for the current year upon the ground of exemption, to search those lists, and if his name is upon those lists, it is his duty to appeal.

545. That is, in the case of exemption?—In the case of exemption.

546. I was referring to a case of misdescription; are those lists published before they go to the magistrate in petty sessions, or afterwards?—They are published before they are bound up into the juror's book.

547. That is before they come to your office?—Before they come to our office they are published; previous to that I hardly know what happens.

548. As far as you know there is no check on the description that these gentlemen give of themselves?—As far as I know there is none; but at the same time there may be; the officers of the parish may take upon themselves to investigate these matters, and say, "such and such a man returns himself as an esquire; we disallow that title, and put him upon the common jury." They have that control; how far they investigate that matter for themselves is not officially in any way within my knowledge.

549. The complaints, as far as you know, arise very much from the small number of those who are liable to serve?—I consider (and I state i emphatically) with regard to the objections which do no doubt prevail, that any inconvenience to the public or the jurymen would have been the exception, and not the rule, if the sheriff had been supplied with an abundant list of specia jurors, instead of the wretched list which is supplied to him. We have to perform very laboriou duties, because you must bear in mind (and perhaps the Committee are not aware of the fact) that this system has existed during many years, and when the cause lists were light, it worked very well: but now that the business of Westminster Hall is certainly twice as great as it was a few years ago, all these difficulties begin to show themselves, because there is more work thrown upon the special jurors than the special jurors find it convenient to submit to.

550. There are not only the courts in Westminster Hall, but other courts in London?—Yes; and of late years the other courts have been constant. I may refer to the Sheriff's Court, in which I am engaged myself, and especially the compensation claims, and claims under the Railway Consolidated Act, which are brought before the sheriff for the most part, and the sheriff has to summon a special jury to investigate those matters. All that has to be borne by the special jurors in Middlesex, and has been added to the labours which they have at nisi prius, and has helped to bring about the complaints which we have heard lately.

551. Can you give us any opinion about the quality of the jurors, if I may so express it, whether the men who are summoned on a particular jury, either common jurors or special jurors, are well up to their work or not?—You mean whether their verdicts are satisfactory, perhaps?

552. Yes?—I apprehend that every verdict delivered is unsatisfactory to one side or the other.

553. You have no opinion to give us on that question, then?—I have no reason to doubt that they are a very intelligent set of men, for the most part.

554. Perhaps I did not put the question sufficiently clearly. I meant to ask whether jurors, generally speaking, are sufficiently intelligent for the work they have to do; whether they are efficient men, in fact?—I consider the special juries quite equal to the duties cast upon them, for the most part, in regard to determining the matters which are laid before them.

555. Mr. *Turner.*] Did I rightly understand that it is entirely in the discretion of the overseers what persons they put down on the list for special juries; are they bound to put down everybody who is liable, or have they discretion as to whether they should put people down or not?—I apprehend that they have a discretion; there must be a discretion somewhere, of course, but they are bound by the law. The law says that certain people shall be exempt; of course peers, judges, doctors, attorneys, barristers, clergymen, and so forth, are exempt, and of course they are bound by law not to put any of those persons so exempt on the jurors' book, and if they do put them on, it is inadvertency.

556. But supposing that they leave off the list parties who ought to be on it?—You mean, that supposing a person wished to be on the jurors' book, and he was not?

557. No; supposing he wished to be off when it was the overseer's duty to put him on?—If a person wished to be off the jurors' book, there is no ground of appeal, and there is no way by which he can claim exemption.

558. Do not you think (it is at all events suspected to be the case by the public) that parties are left off the list, by overseers, who are legally liable to serve?—I can only say that I am not aware of that as a fact; I can only say that it has never come to my knowledge as a fact, in any individual case, that any man has avoided being upon the jurors' book through the instrumentality of any person whatever.

559. Is it your opinion that everybody is put down upon the jury list, by the overseers, who is legally liable to serve?—No, I cannot say that; it is impossible for me to say that without investigating the case myself.

560. Then, is there any care taken by any person, except the overseers, to see that all the parties are put in the list?—I must say I assume it, but it does not come within my knowledge.

561. In the case of any omission by the overseers, from any cause whatever, there is no investigation of the list by any other party with a view to put on the list any one who may have been omitted from carelessness or any other cause?—You see that there is no person interested in revising the list; if we look at the lists of voters, all those lists are overhauled from time to time; but there it is a matter of public and individual interest; and then there are persons who are at work to overlook what is going on; whereas, in reference to the list of jurors, there is no one who takes any interest in the matter; it is an unpopular service, and do what we will, it always has been, and always will be, an unpopular service, because it has been an unremunerative service.

562. Then, in case the overseers, either from carelessness or any other cause, leave a man's name off the list, it remains off it?—It remains off it; there is no one to jog their memory upon the subject; there is no one who takes interest in the matter to investigate the question, and compel them to do their duty; at least, I apprehend that there is no one to do that.

563. Does that apply equally to common jurors?—That applies to the jurors' book generally; there are no amateurs at work there, or paid official agents, as in the case of voters' lists, to look into the matter.

564. I think you have already said that, as regards the description, there is no one to inquire into the description which any one who is applied to chooses to give of himself, as to whether it is correct or not, as to his being a stockbroker, or merchant, or banker, or esquire, or gentleman?—The overseers have, no doubt, and can if they like, exercise, and perhaps from time to time do exercise, the control over that, and investigate it; but I should think that, as a rule, they would be inclined to take the description that a man gives of himself, because the labour of investigating in every individual case whether or not a man is entitled to the addition of esquire would be very considerable.

565. In point of fact, every man who wishes to be excused gives such a description of himself as he wishes?—If it passes current, no doubt he does. With regard to the common jury, of course I should be in the hands of the Committee to answer any question they may put to me, but I do not think that I can give them so good information on that subject.

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566. A man in one place may describe himself as a stockbroker, and in another place he may describe himself as esquire?—It might be so; he might have two residences, and, indeed, I think I may say that that has come under my notice more than once.

567. When he wishes to be on the common jury list he puts himself down under one description, and when he wishes to be on the special jury list under another?—I think it might be inadvertence. A man might return himself as an esquire in one residence, and as a gentleman in the other; or his servant might fill it up for him, and that, I apprehend, is often done.

568. I suppose that in the country he might be called an esquire, and in town a stockbroker?—That might easily be the case.

569. Mr. Alderman *Lusk*.] I suppose that you approve of the present system of trial by jury?—That embraces a very wide field of observation; but if you will direct my attention to any particular matter, I shall be happy to state my views on it.

570. I suppose you approve of it?—Of the system of trial by jury at large? Yes.

571. Do you approve of the present way of bringing a jury into the box; all the machinery of the ballot box, the accommodation, and so on?—The duties cast upon jurors are almost, I should say, beyond their power of properly carrying out. There is no accommodation for them. You may see any day in the Court of Common Pleas (I take that because it is the smallest court of the three) 60 or 80 special jurors summoned to a court where there is no accommodation for them, and where they are driven about like sheep in a cattle market.

572. They are not used as they deserve to be?—They are not used as they deserve to be, considering the important part in the administration of justice which they are called upon to take.

573. I suppose you think that the part which the juryman performs, is a very important part of a trial?—Certainly, to say the least of it, a most important part of a trial.

574. Do you approve of the balloting system for special jurymen?—I apprehend that the advantages of the ballot might be retained, and the inefficient part of the machinery might be improved.

575. Are not the advantages more than counteracted by the disadvantages?—Not if we have a proper number of jurymen. I attribute the objections, which now prevail, to the very few jurors that we have to do the work; they are called upon over, and over, and over again, and that irritates them. But beyond that (and really it is a crying evil; of course, I suppose it is to be redressed when the new courts are built) there is no accommodation for the jurors who are summoned to the court, not even the accommodation of a seat. Elderly men, and men accustomed to luxury, are summoned to a court where there is not room even to stand, where their pockets are picked, and where they are pushed about greatly to their discomfort.

576. Supposing that you take a jury by a ballot, it is a chance what jury you will get?—Yes.

577. And supposing that you have a panel drawn, it is a chance; suppose you are a litigant, and you draw 48 men, and then strike off 24,

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you cannot tell what 48 men you will get; where is the difference then between a ballot and a panel?—Supposing that I was the attorney nominating a jury, I should investigate the lists carefully; for instance, if I found Mr. Alderman Lusk's name upon the panel, I should invariably retain it, because I should apprehend that as an acute man of business, and as a magistrate, he would be sure to be an able juror.

578. That does not answer my question; you have power to strike off 24 in each case?—The parties have.

579. What is the difference between a panel of 48, from which you can strike out 24, and the ballot; that is to say, drawing for every case, and striking out 24?—You mean the special jury system, as compared with the common jury system?

580. In either case; we are talking about a panel of jurymen, to continue for three or four days, say?—That is not the system.

581. I know it is not the system, but supposing it was the system?—It is such an inconvenient system, that it could not work; if you were to summon them for three days, the sheriff would constantly be summoning a fresh set of names to the court.

582. You mentioned, I think, that if merchants were to come to a panel a few days consecutively, it would be very hard for them to attend?—If they were to come as the common jurymen do for several weeks at a time, I apprehend that it would be extremely hard, though no harder than upon the common jury.

583. Supposing they were to come for three days or four days consecutively?—I think that that would be provocative of other inconvenience; you might summon 60 men from Monday to Thursday, and another 60 for the rest of the week, and so on; it would put the sheriff in constant motion.

584. Never mind the sheriff, what about the public?—I think that it would be very inconvenient to have a constant change of jurymen in that way.

585. Do you mean to say that panels lie by sometimes for 18 months or two years?—Yes, I do.

586. With reference to the common juries, do you say that they work well?—I think so, I mean with regard to the convenience of the public; I am not speaking in the interests of the jurors, although I have an opinion upon that.

587. You summon 60 common jurymen to each court?—Yes.

588. And does that answer the purposes of the court very well?—As a rule, it does; it depends a good deal upon the class of men that happen to be taken.

589. For how long are they summoned?—I should think about six weeks; from six to seven weeks. They attend every day.

590. Is not that a very long time?—I think so, to be taken from your business, when you have no substitute, perhaps.

591. Do 60 men answer in court as the usual rule for working?—Yes, as a rule, for the six weeks; they have to be fined now and then.

592. Do you approve of special jurymen as a class?—I hardly know how to answer the question in that form.

593. What sort of questions come before the common jurymen?—It is for the discretion of the parties. Supposing, for instance, that the matter in dispute is a small sum of money, a common jury will be called upon to decide it.

594. Supposing that it is a case of life and death at the Old Bailey, who tries it?—A common jury.

595. Supposing that it is a case involving a man's character, who tries it?—The same persons, or at least from the same class.

596. Do not you think that when a man's life and character are at stake, the question is of more importance than a bill for 100 *l.*?—I apprehend, certainly, that reputation is more valuable than money.

597. The names of the jurymen are all selected by the sheriff from the clerk of the peace's list, are they not?—Yes.

598. You mention that 65 was a more reasonable age than 60 for exemption?—I think that the age might very properly be raised to 65, because so many men at 60 years of age are perfectly sound and hearty, and able to sit in a jury box.

599. Are they not often very discreet men about that age?—I apprehend that it is a very good age; I should think 60 was the age at which they began to be in the prime of life, when they have health.

600. Are you quite sure that the special jurymen of Middlesex are only 1,800?—I am quite sure, from the numbers on the books.

601. But if you take up the Directory, and look at the esquires in Middlesex, you will find that there are ten times 1,800?—And I want to get hold of some of those.

602. Taking a man's own description of himself as banker, esquire, or merchant, you will find ten times 1,800 in Middlesex, I apprehend?—In the jurors' book I do not find it; they do not return themselves as esquires or merchants, but they return themselves by some other addition.

603. Then there must be a monstrous abuse in some way, because here they return themselves in the Directory as esquires?—I do not think that it can be properly termed a "monstrous abuse" if it is examined, but I think that the system is defective, and that some parties take advantage of the defect.

604. Who is it that summons the juries; that is to say, who is it that carries out the summons?—The summoning officers.

605. What class of men are the sheriffs' officers?—They are bailiffs appointed by the sheriff, by yourself, a few years ago, when I had the pleasure of meeting you from time to time in the office of sheriff; you were then responsible for the appointment of officers.

606. What salary do these men get?—They get no salary; they are paid by fees of the office. Serving the summonses is only a very small portion of their duty.

607. Are they men of considerable respectability?—They may be variously described; we have had from time to time all sorts.

608. Because I have heard it often said, and I should like to know whether it is true, that these men take money from people to say that they are not at home?—I am glad to say that that is a most unjust accusation. I do not believe that our officers do take fees from special jurors to avoid service; and, if you remember, a short time ago there was a case where a party who was, so to speak, an outsider, with whom the sheriff had no communication whatever, was employed by special jurors to state that they were out of town

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town, when they were in town, and took fees, and made a livelihood of it. Now, it stands to reason, that if the jurors could have done this through the instrumentality of the sheriff's officer, they would never have gone to an amateur, because they would have done it cheaper and more efficiently by far through the sheriff's officer; and it is proof to my mind that they could not do it through the sheriff's officer, when we find that they employed a man who was a third party, and of whom the sheriff knew nothing whatever. And I take leave to say, that the party who delivers the summons is a poor man, and an uneducated man, while the party to whom the summons is directed is supposed to be a rich man, and an educated man, and, I would ask, is it not worse that a party in that position should throw a temptation in the path of the poor man, than that the poor man should take advantage of that? And yet the poor get all the blame, and the rich none.

609. I am asking the fact?—I do not believe as a fact that our officers do that as a system.

610. Several gentlemen have have told me that they were never on a jury,. and they have told me again and again that there were ways of managing these things?—I have not been able to bring it home to any of them. From time to time since I have had the honour of acting as deputy sheriff, jurymen have come to me, and said—"I know that I can get off; my neighbour got off by giving a guinea;" I have said, "Name the man; let me know the case;" but they have never been able to do it.

611. What qualification do you think that jurymen should have?—I think it should depend upon the residence.

612. Money rental?—Rental; we cannot investigate the intelligence of a man.

613. You do not think that income would be better?—Income is represented by house, I apprehend.

614. Supposing that you had income as a qualification, would you not get a class of men whom you cannot get by rental?—I think not; I should say it should be rental, if my suggestion were adopted.

615. Do you think that the present qualification is high enough, or too high or too low?—I think that the common juror's qualification is quite low enough.

616. Do you think that it is too low?—No, I should not wish to say so; it is quite low enough, and I would not reduce it. The fact is that there is so much to do in this county for jurymen, what with criminal courts, grand juries, special juries, compensation cases, and one thing and another, that there is more than the jurymen can conveniently perform. If we had no grand jurymen, and our grand jurymen would turn into special jurymen, then we should get on nicely, and hear of no complaints.

617. I am glad to hear you say that. You wish grand jurymen to serve as special jurymen?—We have plenty of grand jurymen for our list, but I say that if our grand jurymen would turn into special jurymen, then we should get on without complaint.

618. It does not come under your notice what the overseers and all that class of persons do in forming the lists?—No it does not; our duties begin when the book is delivered at our office.

619. Mr. *Charles Wynn.*] There is one point to which I think our attention has not been directed, which is very important, and perhaps you can give us the information (if not, I will ask for it from somebody else), namely, as to the time that elapses in the different steps between the summoning of a special jury and their assembly. We will say that a cause is set down at the sessions for a special jury, will you give us the length of time that elapses?—It depends entirely upon the parties in the cause. Supposing that a rule for a special jury is taken out to-day, a copy of that rule may be furnished to the sheriff to-morrow, and in two or three days that jury may be nominated, and in two or three more reduced.

620. That rule may be served, you say, upon the sheriff to-morrow; when does that meeting of the plaintiff's and defendant's attorneys take place to which you have adverted, to reduce the jury?—At their convenience.

621. Any time before the trial of the cause?—Any time before the trial of the cause. And then it is the duty of the associate of the court to give them a notice when the court has appointed a day for the hearing of the particular cause. It is then their duty forthwith to deliver a notice to that effect to the sheriff, and to request the sheriff to summon the jury; and it is owing to delay on the part of the attorney in performing that duty that the delay takes place.

622. At how late a period may that take place, and often does take place before the trial?—Just the day before it may, and often does. I stated that as one of the objections; the jurors most properly complain of the fact of being summoned, perhaps, at 9 or 10 o'clock to-day to appear at Westminster Hall to-morrow; but they complain of the sheriff and his officer, whose duty is mechanical, and who have no more to do with it than the judge to whom they make their complaint.

623. Mr. *Headlam.*] You have not anything to do with the original formation of the jury list?—Nothing.

624. You do not suggest any alteration as to the qualification?—With reference to special jurors I have suggested some alteration.

625. The special jurors, in the first instance, I take it, are put upon the list in common with the grand jurymen and common jurymen; the list is made out without distinction in the first instance, is it not?—They are described as merchants, esquires, and so forth; I would enlarge the number of special jurors by enlarging that description.

626. I take it, that in the first instance every person who has got the qualification requisite by law, for a juryman, is put upon the list, with his description and qualification; that is the mode in which the list is made out?—Yes, with his address and his description.

627. You do not suggest any alteration in the qualification for being placed upon that list to begin with?—I should not suggest any alteration with reference to that.

628. Now, as I understand it, having got the full list of all the persons who have got that qualification, some are distinguished by the letter S. being put opposite their names for special jurymen?—No, they are distinguished simply by their addition; the sheriff extracts them, not from any mark that the clerk of the peace makes in the book to show that they are special jurymen, but by their addition.

629. He determines from the fact of their own

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description of themselves whether they are to be considered as special jurymen or not; is not that so?—The overseers, you mean, are satisfied with the description given of themselves by the individual jurors: I apprehend that that is so; at the same time they have a discretion if they choose to exercise it.

630. Who is it that, having got the general list, divides them into special jurymen, grand jurymen, and common jurymen?—The sheriff.

631. And he does that simply and solely by the description which they give of themselves?—By the description which is given of them in the book.

632. And which description arises from their own description of themselves?—Perhaps 20; I say that the officers of the parish have a discretion, if they choose to exercise it, as to the way in which persons are put on the list.

633. To go back to the beginning, do you think that any people evade being put on the list at all?—That I cannot answer. I know this, that oftentimes gentlemen come to me and say, "I am summoned over and over again, and my neighbour is not summoned, and I am quite sure that your office is favouring him;" we look to the book and find, perhaps, that that name is not on it, and I say, "The reason your neighbour is not summoned is because he is not on the book;" and I tell him that if he investigated the matter he might find that the party he alluded to is exempt from some cause he does not know of; perhaps he is a wholesale druggist, and has entered himself as a chemist.

634. Is the list made out without the exemptions, or with the exemptions, as the overseers deliver it to the sheriff?—There is nothing about exemptions whatever; every man in the book is a juror.

635. You cannot give us any information as to the question whether people evade, in the first instance, being on the book?—I cannot.

636. Now, coming to the distinctions, you consider that the qualification of a special juryman should be the possession of a house?—I should suggest that it should be a mere matter of rental; a man inhabiting a house of a certain character should be eligible for a special juryman.

637. What value should you suggest for the house?—I would say 80 *l.* a year: I am now speaking of matters which are not within my official knowledge; but I think we might assume that any man paying 80 *l.* a year rent is equal to the duties of a special juryman as regards intelligence and probity.

638. You would suggest that a man having a house of 80 *l.* rateable value should be put down, as a matter of course, as a special juryman; and, I presume, as a consequence of that, be exempted from serving as a common juryman?—He is not by law exempted from serving as a common juryman, only the practice is, that inasmuch as the special jurymen have plenty to do as special jurymen, we never summon them to do the work of common jurymen, though they are liable.

639. Would you in practice let the special jurymen who do not serve on special juries be liable to serve on common juries?—I would leave that as it is; they are liable in Middlesex, but we never summon them, because we find that they have enough to do, and more than enough, as special jurors.

640. You think that if you took such a qualification as say 80 *l.* a year rateable value, your list of special jurors would be much larger than it is?—I am satisfied in my own mind that instead of 1,800 we should then have 7,000 o 8,000.

641. Then to that extent the common jury list would be diminished?—The grand jury lis would be diminished. There is a large section of the business which falls upon what are called grand jurors, whom we select from those of the common jurors who are described as gentlemen principally; that is to say, builders, wine merchants, and those who are of the higher class, not shopkeepers. Bankers, merchants, and esquires, are put down as special jurors; and men described as wine merchants, builders, and so on, if the residence seems to admit of it, we select for grand jurors.

642. I suppose they are marked as grand jurymen?—They are not marked as grand jurymen; they are described.

643. I take it that on the list there must be some mark to designate those who so describe themselves?—There is nothing on the face of the list to point out what persons the sheriff shall take for grand jurymen, or what persons for common jurymen; the sheriff takes the description, and if they are described as gentlemen, or as builders, and so on, we take them for grand jurymen.

644. Is there no period at which you go through the list, and looking at the addresses and qualifications of persons, make a note of them in any shape or form?—A jury has to be struck, say for the Old Bailey, at which a certain number of grand jurymen have to be summoned; it is the duty of the sheriff to take so many names for grand jurymen, and those are selected according to the description against them in the book.

645. There is never any period at which the list is gone through, and the descriptions examined, and certain persons designated as special jurymen?—Yes, in the first instance, as soon as the jury book is got from the clerk of the peace, the sheriff makes out from it what is called a special jury book.

646. Is the same thing done with respect to the grand jury list?—No.

647. So that there is no distinction made in that way between grand jurymen and common jurymen?—Not in that way; no grand jury book is made up by the sheriff.

648. Can you tell us what sort of proportion are grand jurymen?—I could not; it would take a long time to calculate; if I had the book before me, and referred to it, I could perhaps give some idea.

649. With respect, then, to all who are grand jurymen, they are not put upon the special jury list?—They are not.

650. Is there a large number of those who do not practically serve as grand jurymen?—There is.

651. They escape altogether?—They do.

652. That number is very considerable, I understand you?—I will not say very considerable; there are some that escape, I have no doubt. Without the book, I could not say how many; but there are a great many grand jurymen not made use of, no doubt.

653. As far as I understand it, the only improvement you would suggest upon the present system is, that of taking it at the rateable value of a house, instead of a condition, to determine

whether a man should be a special juror or not?—Yes.

654. *Chairman.*] It is now 30 *l.* a year, is it not?—That is with reference to all jurymen; I would not propose to alter that.

655. Mr. *Turner.*] You would not put it under 80 *l.* rateable value for special jurymen?—No.

656. Mr. *Headland.*] Would you leave the distinction between grand jurymen and special jurymen, or not?—I think I would not.

657. You would make it all one list?—I would.

658. And allow a selection of men from the same list to serve as grand jurymen, and to serve as special jurymen?—I would.

659. And would you exonerate any man who had served as a grand juryman from serving on special juries in the same manner as you suggest that a man who had served once on a special jury should be exempt from serving again till the list had been gone through?—I should not put it that I would exonerate him; but in practice his name should not be taken again until all the other names had been taken.

660. You would give him credit for serving on a grand jury as a reason why his name should not be put on a special jury also?—That could not be done by the ballot system in practice.

661. As to summoning special jurors, would you summon them as they are summoned at this present moment, for each particular cause; or would you summon them as the common jurors are summoned?—As I have explained before, each system has its advantages. There are advantages in the present system, and there are advantages in the other system; but upon the whole I think that the advantages of summoning them for each cause predominate over the disadvantages.

662. Supposing that your lists of special jurymen were increased to the extent you speak of, there would then be a considerable number of special jurymen who did not serve on special juries?—No; according to my system they would all serve in rotation, only it would be a long time before their names were required again. By the system of ballot, some names must turn up oftener than others, and to avoid that I would exhaust the whole number of tickets.

663. Supposing that you had a list of 8,000 special jurymen, a certain number would be taken out this year, we will say; how long would it be before those persons would come into the list again?—If we had a list of 8,000, we might work it, as we are now working it, very well indeed. A man might be summoned for two courts at the same time, upon an occasion, but it would not be often. If we had 8,000, the Committee would not have been troubled with this inquiry.

664. Would you allow the 8,000 who did not serve on a special jury to be mixed up with the common jurors to serve on common juries?—I think not; it would be inconvenient.

665. However large the list of special jurymen were, you would keep the list solely for causes for special juries?—Yes.

666. Have you anything new to suggest in reference to the payment of jurors?—The special jurors are paid a guinea to each man for each cause; the common jurors are paid 1 *s.* Of course, we must all of us know that that is no remuneration whatever, but if the common jurors are to be properly paid it will make litigation very expensive.

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667. You have not anything to suggest in regard to that, but you would leave it exactly as it is?—I should like them to be paid; at the same time I see the difficulty of providing payment for them. I see that it would make litigation so costly if the common jurors were to be paid.

668. When a special juryman was summoned for a cause, and the cause practically did not come on from its being arranged, or from any other cause, would you pay the special juryman in that case?—I think that if special jurymen are in attendance upon summons, those that answer to their names should receive their guinea, that is to say, if the cause is withdrawn at the last moment; of course, if it is withdrawn a day before, and a notice is sent to the parties, saying that their attendance is not required, there is an end to the matter, and I should not think of referring to any inconvenience that they may have had, but if a juryman attends, I think that he should be paid.

669. Would you make the payment for the special jurors to take place at an earlier stage in the cause, for instance, when the parties determine that it should be a special jury case?—If you mean whether the fees should be deposited with the sheriff, as upon a new jury, I should say not.

670. Supposing the cause to be withdrawn, should the jurors be paid?—Supposing that at the last moment a cause is withdrawn, I think that the jurors should be paid just as if they had fulfilled their duty, because the chief inconvenience in the matter has been gone through, that is to say, their attendance upon the court, and making their arrangements to give up business for that day; that being done, I think that they should be paid.

671. Mr. *Freshfield.*] Am I wrong in supposing that you think that the principle of making out the list of the jurymen, special and common, has something radically defective about it?—No, I do not think that I have stated anything to that effect.

672. Then you do not think that?—I do not.

673. Are you then satisfied with the number of the special jurymen in Middlesex?—No; quite dissatisfied, but I think that the law should be altered; I do not think that we could retain the present law altogether with reference to making out the lists, and get a sufficient number of jurymen.

674. By the principle of making out the list, I meant the law?—I would alter that.

675. Will you tell me how?—By making every man eligible for a special jury who occupies a house of a certain value, unless that man could show some reason why he should not be placed on the list; I would make him *primâ facie* liable.

676. As I understand you, you see no reason for the distinction between the special jurymen and the grand jurymen?—I do not; I think that the duties in the one case and the other are very much the same.

677. If you destroyed that distinction you would have then a very large list of special jurymen and grand jurymen?—We should.

678. Do you think that that would be an improvement upon the existing system?—I think that to multiply our special jurors would be an improvement, and the great improvement which we are all seeking.

679. You have no great objection to the sys-
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tem of the common jury?—No, except in the interests of the jurymen themselves.

680. Do not you think that a common juryman is summoned for too long a period?—Yes.

681. Might it not be remedied by his being summoned for a short time?—Say in term and after term.

682. Or for shorter periods even than that?—It would provoke inconvenience.

683. Would it cause the sheriff more trouble?—It would; but it would cause others more trouble besides the sheriff.

684. Might not a jury be summoned, say for not more than a week, and then replenished?—I think that it would be inconvenient, if you ask my opinion, and I think that it would be better to summon them for term and for after term.

685. What would be the effect of commencing them for term and after term?—That they would sit for about three weeks instead of about five.

686. Do not you think it a hardship upon a common juryman to have to leave his home, with perhaps very small means of subsistence, for three weeks?—I think it a very great hardship.

687. Do not you think that if, at a small inconvenience, jurymen could be relieved at the end of three days or a week, it would be a better system?—I think that to the public the objections would predominate over the advantages.

688. Will you state the objections?—I think that it would be inconvenient to the officers of the court generally to be constantly having to hear fresh appeals. There are a certain number summoned, namely, 60; before the business of the court can be proceeded with the jurors have to be called over, and there are various excuses raised, and it takes some little time for the court to hear those excuses, and so on; and after that is done there is an efficient panel of jurors to proceed with the work. But if that had to be gone through every three days, I think that that alone would be a great inconvenience.

689. Do not you think that that inconvenience would be small, comparatively speaking, looking at the great inconvenience to those 60 men of being detained for six weeks?—No; it would lighten their duties at the expense of the public.

690. You think that it would be too much trouble to the officers of the court every morning to hear a fresh appeal, which might perhaps last a quarter of an hour, that that countervails the inconvenience to the juryman of being detained five or six weeks?—As a public man, I think it would.

691. I think you say that the jury are often not summoned early enough by the attorneys?—By the sheriff, in consequence of their not putting him in motion early enough.

692. Do not you think that that might be obviated by the sheriff summoning the jurors directly the cause is appointed?—I have stated so.

693. What notice does the associate give?—The associate's letter is simply the fact notified to the attorney that the court has appointed a certain day for the trial of his case; the attorney may then put the thing in motion at once, or he may retain it for days.

694. Do you know how many days' notice the associate gives?—I cannot say.

695. Is it ordinarily more than four or five days?—About that; but it may be 10 days.

696. Do you think that there could be any objection to the principle of having one panel as well of special jurymen as of common jurymen for all the causes in all the courts?—I have stated the objections to that, which I suppose are on record. I stated just now what I thought the advantages of the system of ballot.

697. But I put it to you under rather differen circumstances; taking the whole of the three courts, would you see any objection?—But we must have a separate panel for each court.

698. Why?—Because the jurors could not possibly be called for all the three courts; it would be practically impossible.

699. I assume a time when the three courts will sit close together?—If you are assuming that the distinction between Common Pleas Queen's Bench, and Exchequer, will be abolished and that there will be one hall of justice in which all causes will be tried, two-thirds of what I have said will not be available.

700. Looking forward not so far as to the absolute union of the three courts, but to their being located together in one hall, then a special juryman might be summoned for the three courts?—I think it is quite impossible.

701. Mr. *Whatman.*] You have spoken of the grand jury; I think I understood you to say that they are generally taken from the common jury lists?—Yes; those described as I stated.

702. From the larger and more important class of men in the common jury lists?—Yes.

703. Is there any restriction requiring the sheriff of Middlesex to summon the grand jurymen from those lists or from any existing lists?—I have stated that the special jurors are liable to be summoned as common jurors, but we do not do it in practice.

704. That is not my question; I ask whether there is any restriction upon the sheriff of Middlesex to summon the grand jurymen from any of those existing lists?—I would summon them from the special jurymen. A grand jury taken from the class of special jurymen sits four times a year at Westminster, the grand inquest jury before which tribunal it is supposed that important matters, if they arise, will be brought though they never do arise, which nominal duty the jurors have to perform at very great inconvenience.

705. But in ordinary cases, is not the grand jury list selected entirely at the discretion of the sheriff?—It is selected at the discretion of the sheriff.

706. Mr. *Charles Wynn.*] With regard to the summonses upon the special jurors, is personal service required?—No; if so, we should get very few special jurymen.

707. The leaving it at a man's residence is sufficient?—Yes; or otherwise they would take care to be out of the way.

708. If the juryman summoned is out of town or any representation to that effect is made by the servant, is any indorsement made upon the summons?—Yes, that is the course; but it is the duty of the party to send some person to the court to make that statement to the court, and not to entrust it to the summoning officer whose duty is over when he has delivered the summons he should be there by his agent to represent the fact of his being away.

709. The owner being abroad, a servant being left in charge of the house, a summons is left we will say, and the servant does not know what to do; in the absence of any excuse, would that man be fined?—In the absence of any further excuse, he would not, because the officer would state to the court the fact, that he was away; but in strictness, the party is bound to have a representative

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representative in the court to state the fact that he is away.

710. Mr. Alderman *Lusk.*] On oath?—Yes; supposing it was a servant, he would be asked, "Was your master away from town before the receipt of this summons?" "He was." That is sufficient.

711. Mr. *Turner.*] Is there any minimum period within which it is necessary to serve a special juror, and within which a notice served upon a special juror will not be compulsory?—Yes; they will not fine a juryman unless he has had two days' notice, but the jurymen are not aware of that, and they constantly attend upon a summons which they get the day before, and then come to the court and complain, whereas if they knew, they might disregard it, and if they were fined through inadvertence, they would merely have afterwards to state the fact, and they would have the fine remitted.

712. Mr. Alderman *Lusk.*] You mentioned that the common juryman gets 1 *s.* a cause, and the special juryman a guinea a cause; do you think that that is a fair payment for the work rendered, either of the one or of the other?—Can you remunerate a jury? We have had you on our jury list many many years; would a guinea remunerate you? You would say no, and it is so with others.

713. You would think it not a fair remuneration?—I would not propose to alter it, because if you do you make litigation so expensive.

714. Why should not a juryman be remunerated as well as any other party in a cause or trial?—I am quite aware that there is a difficulty about it; if cause lists are analysed the names of some will be found over and over again, and the names of others never found.

715. Why should not a juryman be remunerated as well as a barrister, judge, door-keeper, and any other person employed about a trial?—In theory I can see no reason why he should not, but in practice I see objections to it.

GEORGE WILLIAM GILLET POTTER, Esq., called in; and Examined.

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716. *Chairman.*] YOU hold some office in the City do you not?—Yes.

717. What office?—The office of Secondary.

718. What is that office?—It is a very ancient office under the Corporation. He is under-sheriff as regards the execution of all process from the Courts of Record at Westminster, and generally his duties are to advise the Corporation in all matters.

719. Your office corresponds in the City of London to that of Mr. Burchell in Middlesex, I suppose?—In regard to the execution of process from the courts at Westminster, directed to the Sheriff of London and as above, I am the principal officer, not a deputy.

720. Have you a deputy under you?—No.

721. Is the system of summoning special and common juries different in the City of London from that in Middlesex?—Yes, it is different; I have brought, to show the Committee, the instruction that I give yearly to the ward clerks, deputies, and all the common council, and the aldermen. The aldermen and common council make a return to the sheriff, and until that return is made to me I have nothing whatever to do with the selection of the jury. (*The Witness delivered in a copy of the Instruction.* Vide *Appendix.*)

722. These instructions are sent out to whom?—To the aldermen, deputy, and common council of the wards; you will see by the last paragraph at the bottom that they, the aldermen, and common council, and ward clerk, revise the list, sign it, and send it to the sheriff.

723. Then do these gentlemen, the aldermen and common council that you mention, revise the lists?—They do.

724. They are, then, the parochial authorities for the City, with regard to the revision of the jurors' lists?—They are the ward authorities.

725. Are the lists delivered at the same time as in the county of Middlesex?—Precepts with the letter sent out by me in November, the lists to be returned by December, the jurors book in for January 1st.

726. Having received the lists, if you are called upon for a special jury to be summoned, do you pursue the same system as is pursued in the county, as you have heard Mr. Burchell describe it?—When all the lists are returned to me, I extract from them all the persons under a certain description therein, namely, merchants, esquires, bankers, or persons of a higher degree, and I form that into another separate part of the book; it is bound up together, and the special jury book is numbered consecutively from one to the last number, and tickets are made with corresponding numbers upon them for the ballot-box; and, as Mr. Burchell has described, both the attorney for the plaintiff and the attorney for the defendant attend; my clerk puts his hand into the box, brings out a ticket, refers to the book and the numbers, and each of the parties writes down the names, till 48 are drawn. The parties then either reduce the list by agreement, or they have two days to reduce it. I make an appointment for them to reduce the jury to 24, and should they not attend I give them a peremptory appointment: and if they do not attend then, I reduce it myself.

727. The list is then entrusted to your summoning officers to serve, I suppose?—When the reduced list is returned to us by the attorneys, signed by both parties, we give it to the summoning officers with a summons for each person on the list.

728. Who are they in the City?—The serjeants-at-mace; they are appointed by the corporation.

729. How many in number are they?—There are six, two of them for each court.

730. And they leave the summons at the residences of the jurymen?—Yes; or they cause them to be served, if they cannot do it themselves, because at times they are so pressed that it is impossible for the six to do the work.

731. Have they any deputies authorised to do it, or do they entrust it to anyone?—They entrust it to a party of respectability, and they are answerable for him.

732. Have those parties any particular name in the City?—No.

733. What are they?—The persons employed generally by the serjeants-at-mace to assist them.

734. Are they messengers?—They ensure always a person of respectability, because they are answerable for his acts.

735. Have you heard of complaints in the

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City in regard to the way in which special jurors are summoned?—I have heard of complaints very frequently, as far as rumours go, but I have never been able to get anything definite; I could never trace it home, nor do I believe that the serjeants-at-mace or their men have received money.

736. Could you give us any information as regards the number of special jurymen in the City of London?—The number of grand jurors in London are 4,200; petit jurors, 5,000; and of special jurors taken out from the whole of that 9,200, 4,100. I should say that they have very much increased since I have been more particular in sending out these different notices; 30 years ago they were about 1,000 only, and I believe that they will increase to a larger number than they are at present. When the 4,100 were returned this year the ward authorities scarcely had time to give their attention to the latter part of my instructions, which were sent out this year for the first time, and I think that they would have been larger in number if they had had time to do so.

737. Do you believe that the lists are fairly made out as regards the description of the persons, and the number of those who ought to serve?—That I cannot say, because it is left to be revised by the aldermen, deputy, and common council of the ward, and I believe that they are best acquainted with the residents of the ward, and it is left to them.

738. Are the lists revised in petty sessions in the City, as in other parts of the country?—No, the aldermen, deputy, and common council of the ward revise them.

739. And is it to those parties that any claim for exemption should be made?—Yes.

740. Have you considered the point which Mr. Burchell gave us his opinion upon, with regard to the qualification, do you think that the qualification for a grand juryman or special juryman should be raised?—The parties in the ward know one another so much better than they do in the parishes, that I think it should be left to them to say who are the proper parties to be designated as merchants or esquires.

741. You have no opinion of your own on that question?—No, I should not like to form an opinion upon that. It must be remembered that in London the case is very different from what it is in Middlesex, or any of the other counties, intellect and capacity are required beyond property.

742. The qualification is very much higher in the City, is it not?—It is higher.

743. It is a personal estate of the value of 100 *l.*?—Yes.

744. Not a 20 *l.* rateable value?—No.

745. Is that 100 *l.* annual value?—No.

746. Mr. *Freshfield.*] Do you think that that qualification is altogether sufficient for a criminal jury; do you think that it is quite right that all the classes of offences in the City of London, should be tried by men of as low a qualification as that?—That is a mixed question. There are certain crimes, not only crimes of a higher degree, but crimes relating to accounts and money matters, involving commercial knowledge, that would require, for jurymen, persons certainly of a greater intellect than many of the common jury possess, and therefore I should think that in those cases, we ought to have a higher class of persons, who would better understand matters, and be able to judge properly of the criminality of the parties.

747. Then you would suggest a higher qualification for the common jury?—In certain cases, although I say that the common jury would as honestly perform their duty, yet they might not be able to understand the subject.

748. It must have been within your observation that some of the trials we have had of late, referring to fraudulent trusts and commercial cases, a jury of that character are utterly incompetent to deal with?—I think so.

749. In criminal cases you have a common jury, and you cannot have any of the special jurymen?—You have only the grand jury to find the bill, and the common jury to try the cause, except in cases removed to the Queen's Bench to be there tried.

750. Do you think that many of the cases now tried are not capable of being done justice to by a common jury?—I think so.

751. Have you any suggestion to make as to the composition of a jury which could more effectively try the questions which now come up?—I confess I do not myself know why the jury should not be taken from the whole panel, both common and grand jurors.

752. Could you suggest at all the way in which that end could be accomplished; would you take a panel from the whole indiscriminately?—I would take it indiscriminately.

753. So as to have a mixture of the petit and grand jurors?—Yes. You see that the petit and grand jurors are mixed together in the book, and only distinguished by P and G put against them. I would take the panel by rotation out of the whole. I should mention how the petit jurors are summoned in London. We take from two wards. We begin at Guildhall, and one recedes from Guildhall and the other comes to it, so that we have always the two most distant wards, and we take half of our common juries and grand juries from each, so that we always have two wards out of which the common jury and the grand jury are taken, in order that there may be perfect fairness.

754. Still dealing with the common jury, do you think it necessary to summon a common jury and retain them in court for so long a period as five or six weeks?—We do not do that; the sittings in the City do not last more than 12 days at any time. The Central Criminal Court not so long a time.

755. Do not you think even that too long a period?—I think not. I do not know a remedy better than that. I think that if you were to multiply the jurymen, you would not only, as I have heard, give trouble; but I think you would have a difficulty perhaps in getting jurymen, and you would exhaust the panel too soon. It takes 2¾ years to go through the City; if the jury were only to serve for one week, it would come to the turn of each juryman in 18 months.

756. But do not you think that you could dismiss them *die in diem*?—Such a thing could be done; but I do not think that it would be an improvement; I do not find that they complain so much of that.

757. Is not it a great hardship to a man to be called away from his shop for 10 days?—You must take it in both ways. A man very often gets connection by that means from his companions and friends. Moreover, he gets a knowledge of the world, which a man behind his counter would not get.

758. You do not think then that, as a whole, the common jurymen are materially injured by

the system?—I think not; they complain; but every one would complain, even if he were taken for one day only.

759. With regard to the special jurors, as a rule they do complain, do they not?—It is a curious thing, but I can state it as a fact, that 10 years ago, the complaints were the other way; they used to say, "I am on the special jury list, and how is it I am never summoned." But now, within the last 10 years, from the increase of business, and, it may be, from parties living out of town, they have felt the inconvenience; and special jurymen have complained very much indeed, and certainly with great reason, when they have had, it may be, four, five, six, or seven summonses to attend for different causes the same day.

760. Do you see any reason for maintaining the distinction between grand jurymen and special jurymen; might not those two merge?—No, I think not; I think that many of the grand jurymen might be very fit to be grand jurymen, but not fit to be special jurymen.

761. But do you think that there is a sufficient means of judging of the quality of the man who happens to be marked as a special juryman?—It must remain with his neighbours, the aldermen, deputy, and common council of their ward, to judge that.

762. But is it not the fact that among the special juries there are a great many men who ought not to be there, and a great many men in the grand jury list who ought to be in the special jury list?—No doubt of it.

763. Have you any remedy to suggest for that?—My belief is that if the authorities who make the return to the sheriffs did, with those acting under them, their duty, that would not occur.

764. You mean if the overseers did their duty?—No, I mean the aldermen and common council of the ward, and those acting under them; if they did their duty with the knowledge that they might obtain, I think that a good list might be obtained.

765. Mr. *Turner*.] It is the ward clerk's duty, is it not?—The ward clerk makes a return to the aldermen. It is then revised by the aldermen and common council.

766. Mr. *Freshfield*.] You hear the suggestion made by Mr. Burchell referring to the fact that after a special jury panel is struck, the names go back again; do you approve of his suggestion?—I think that there are two modes in which it might be done. One is, that every ticket drawn should go into a separate box, until they have exhausted the whole number, that is one way. The other way would be that all tickets drawn should be put into a separate box for one half-year (I think we might manage with that), and that then at the end of the half-year all should be put back together again, then you would find that no one would be summoned above once, unless the cause stood over for a year or two, when possibly he might have that service additional, but otherwise he would not get summoned for more than one court at one time more than twice a year.

767. You approve of that suggestion of Mr. Burchell's, as I understand you?—Yes.

768. And in that way you think that a special juror would not be summoned more than once in a twelve month?—Not more than once in a half-year.

769. Have you any suggestion to make about summoning the jury, for no one has greater experience than you in regard to that?—The experience of nearly half a century.

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770. We hear that the causes are appointed four or five days before they are likely to come on generally?—Yes, it is so; and therefore the attorneys, not liking to part with their money, send the reduced lists at the latest moment. I constantly complain of this, as I do not have sufficient time to summon the jury. As soon as a case is appointed by the associate of the court, I look for the list to summon the jury. The judges will not fine any juryman unless he has been summoned two clear days.

771. We know that the jurymen complain if the record is withdrawn on the day of the trial, and justly complain; do not you think that there is a remedy for that; might not the money be paid with the summons?—I think it would be very objectionable for it to be paid at the summons; it might be paid into the hands of a sheriff until after the cause was disposed of; but it would be somewhat like bribery if it were paid beforehand, because it is called one party's special jury; then there is another difficulty; there are 24 summoned; how many would you pay?

772. Might not an attorney lodge the 12 guineas beforehand?—How would you have them paid; would you have them paid in court?

773. Might he not leave the 12 guineas with the sheriff at the time he summoned the jury?—Certainly, he might do that.

774. Is there any objection to that?—No, I see no objection to that.

775. If I understand you, you think that the list of special jurymen in the City is not defective in number?—No; and they will be increased.

776. If a better system of selecting the panel were adopted, would that get over the difficulty?—I do not quite understand the question.

777. If the 48 names were first taken out, and then the 24 afterwards selected were thrown into a separate box?—The 48 would be thrown into a separate box.

778. But you see that that number ought to be reduced to 24, because there are 24 who do not serve?—That could be done; indeed there would be no difficulty about it; and it would be a great improvement.

779. Looking at the exemptions, which are very numerous, do you think that these can in any manner be curtailed with advantage?—There is a general class of exemptions (I am almost afraid to say it), as you see, effected under the Act of Parliament, namely, exemptions under charters in favour of particular persons, and I think that they ought not to be allowed.

780. There are a great many persons in the City who are exempted by being under charter, I suppose?—I doubt it, but there is a difference of opinion on the subject. My belief is that they are not exempted, I think that they are only exempted from London local courts, such as the Mayor's Court, the Sheriff's Court, and the Sessions; but I think that they are not exempted by being under charter, as jurymen in the superior Courts of Law.

781. With regard to the payment of the common jurors, do you think that any attempt should be made to pay them better?—I think that men ought to be paid generally for the time and trouble they devote, but at the same time, when I say that they have only about 12 days to serve, and that they have advantages by it (which I have already mentioned)?—I do not know why they should

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should be paid. The payment is very small, 8 *d.* in London; and, before myself, 4 *d.*

782. Assuming all the three courts of common law to sit in one building (and in fact the other courts to be sitting also) to try jury cases, do you think that there would be an insuperable objection to one panel of special jurors being summoned for the whole of the courts?—As I have mentioned before, I think that it would be no longer a special jury, because in London, if they go by rotation, there are a great number of wards (such as Farringdon and Cripplegate Ward, for instance), where there are a great number of retail tradesmen, and if they were summoned for special jury cases they would be of little use in great shipping and commercial cases. The jurymen generally sought after, are those about Fenchurch-street, Mark-lane, Mincing-lane, and all that locality. They possess great mercantile knowledge, and a great number of cases in London, are mercantile cases.

783. You think that the requisite knowledge is secured by having a panel of 48?—I think that the juryman's convenience ought to be consulted and not the parties; it is a privilege to parties to have a special jury, and therefore they ought not to be consulted so much as the juryman; and therefore the mere expenses should be upon the parties; but in order to have a case properly tried, you should have men of competent knowledge for that purpose.

784. And you think that that would not be attained by having one panel to try all the cases in all the courts?—Not in London; I have given a great deal of attention to the subject, and heard many opinions from merchants and professional persons on the subject, and I think it would end in an application to the judge to have special juries, in another name, to try special cases.

785. You know the general purpose of the Committee in this inquiry; have you any suggestions to make with regard to any improvement which you think desirable?—I think there is one which I have already mentioned about the tickets being placed back in the box; then I think that there ought to be supplied (particularly now that the courts are going to be together) a room for each court for the special jurymen to have the convenience of paper and ink, and tables, and a small room adjoining, in which they might see persons; the entrance to the jury-room only being granted to persons showing their summonses, and then as each cause was called on, some one might announce "A. against B.," and the jurymen for that cause would go out. In that way, they would not suffer the inconvenience which they do now; now, there is no adequate accommodation for jurymen. But again, if that system were pursued, of having the tickets put back, there would not be so many special jurymen to attend the court. I should mention, that in the year 1826 I was consulted, together with the late Mr. Collingridge, then secondary of London upon the jury law, in fact, on the Jury Bill, and we paid great attention to the subject, and that part relating to the nomination of special juries was fixed in a great measure by our suggestions.

786. Mr. *Charles Wynn.*] You mentioned as one of the difficulties in getting special juries, the fact of people living out of town?—That was mentioned as one reason of their complaining of having to attend; I say that in consequence of parties living out of town now so much more than they did, and wishing to go away by rail, they do not like the inconvenience of losing their usual trains; but there was a time when they wished to be upon special juries.

787. Are the jury lists in the City made out in respect of a property qualification within the City only?—Only within the City.

788. Therefore a man might be fully qualified to be a special juryman, but might escape, from occupying only business premises, say, on one floor?—He would be known by the common council of his ward most likely, or by the ward officer.

789. But he would not be summoned as a special jurymen, would he?—If he was returned by the description in the Act in regard to special juries, he might be.

790. Although only occupying two rooms?—One room is sufficient.

791. Should you think that in a commercial criminal case, the case of a banker's clerk say, charged with fraud, or the Redpath fraud for instance, the prisoner would have as good a chance before a special jury as before a common jury?—A much better chance of a fair trial before a special jury. Many of the common jurymen are special jurymen.

792. You would not think of sending a man on trial for illegal combination before a jury of master manufacturers, would you?—Not as such; may be all juries are subject to challenge their minds to such cases as you have referred to. I cannot, however, speak against the petit jurymen; I think they are very good, many of them.

793. Would not the tribunal before which the men were tried consist mainly of a class who were most interested in their conviction?—They are subject to challenge; I am speaking of their knowledge and capacity; they would not be interested, I hope, in convicting any man.

794. Not in the conviction of an individual prisoner, but in a conviction of that class?—Do you mean whether they would be more likely to convict?

795. Yes, more likely to convict?—I think not, particularly protected by the Law of Challenge.

796. With reference to what fell from the honourable Member for Dover as to the payment of the 12 guineas at the time of applying for a special jury, would not then a difficulty arise after the 24 had been struck out, supposing that the cause went off, as to which of the 24 remaining jurymen it should be paid to?—The jurymen must attend, and the first 12 called by order of the court by ballot the sheriff would pay.

797. Mr. Alderman *Lusk.*] You have described to us, I think, that you send out these instructions which you have handed in every year?—Every year.

798. To every ward clerk?—Yes; and to the aldermen, deputy and common council.

799. And you described the process to be that they meet together and go over the whole list of the inhabitants of the ward?—Yes.

800. And make a man a special juror or a common juror just as it suits their fancy?—Yes.

801. And are you aware that they often make a newcomer, though he may be a man of considerable means and substance, a common juryman for a year or two at first to begin with?—I am not aware of that.

802. Do they pay much attention to rent?—I cannot tell you, not attending their meetings, upon what ground they act.

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803. The list comes to you marked with G. for grand juror, and S. for special juror, does it not?—No; the only return to us is G. and P., for grand and petit juror; then we out of that extract another list for special jury by the Act of Parliament.

804. You classify the list, in fact?—Yes.

805. Then when the attorneys' clerks come in they ballot for each cause?—For each cause.

806. They ballot for 48 names?—They draw 48.

807. And they strike out 24?—Yes; each party strikes out 12.

808. Is it not the fact that the attorneys' clerks when they get to know a man always retain him, and throw out unknown men?—Yes, no doubt about it; they keep in those they think the best men, and those most likely to attend.

809. Hence a man who is known has to serve three times as often as a man not known?—Yes; a very good man they would be glad to have upon every trial.

810. The special jurymen are 4,000, you say, in London?—Yes.

811. Do you recollect how many they were in 1860?—Nearly half the number.

812. And every year since they have been increasing?—Yes.

813. What is really the difficulty that we have in the way of getting special jurymen in London; is it the description, or what?—It is hardly for me to give an opinion upon that; but I should say that it was persons known to be of competent intellect and practical knowledge as well as sufficient property that you would put upon a special jury.

814. What does the law say as to the persons you have to choose from?—The law says merchants, bankers, esquires, or persons of a higher degree.

815. Have not we a difficulty when a man describes himself, for example, as a broker, or a cornfactor, or a warehouseman, in knowing what to do with that man, though we know perfectly well that he is fit for a special juryman?—I omitted to say that I think that underwriters, insurance and colonial brokers, shipowners, and many of those men, ought to be on the special jury list, and it is a great omission in the Special Jury Act not to have them.

816. Do you think that the law should be altered in that respect?—I think that the law should be altered in that respect, and the lists greatly improved.

817. More should be taken from that class of individuals that you think are able and willing to serve rather than from mere description?—There are no men more competent than shipowners, underwriters, colonial brokers, and many of those men, to serve on special juries.

818. You know of the many complaints that we have in London, what is the cause that men have sometimes six, seven, or eight summonses at one session at Guildhall, three or four times a year; what is the cause of such an enormous amount of work being thrown upon them?—It is done by lot, and is owing to those parties having appeared in the list; and as you have mentioned, attorneys are anxious to retain parties who will attend, or whom they consider good men to be on a jury. Taking the whole of the special jurymen that we had in the year 1860, which you mentioned at that time, each person would have to serve six or seven times a year by rotation in his turn; and by allotment it is possible that one name would appear very frequently in the 48 names; the attorneys have two days to reduce, and then when they come to reduce they would retain those men whom they thought good men, and likely to attend, for those are the two objects they have.

819. Why should jurymen have to go backwards and forwards at Guildhall, perhaps three or four days before they are called?—That is not in my province. First of all, I think that it is possible that cases may be appointed for particular days, without due inquiry and consideration. That may be one reason; and then the other may be the fault of the attorneys themselves in regard to their not communicating with the judge and the associate.

820. How many causes are often put up to Guildhall, for example, in the Common Pleas, in one day?—Lately there have been a great number. I believe that there are 13 this very day; but then it is the first sittings after the term; it is supposed that many of those would not be prepared, or that they will go off; in the whole 13 cases, juries were not summoned, the lists not having been delivered to the sheriff.

821. How many jurymen are summoned for each of those cases?—If a jury were summoned for each, it would be 13 times 24.

822. And how many courts would be sitting to repeat the same thing?—Three courts might be sitting, the Queen's Bench, Common Pleas, and Exchequer, but they do not in the other courts appoint so many as in the Common Pleas, and that would be only at the commencement of the sitting.

823. The consequence of that state of things is that an enormous number of men are kept going backwards and forwards to these courts, do not you think that those who have charge of the courts ought to be a little discriminating in summoning them to attend?—I am afraid it is rather out of my province to blame them, but it strikes me that it might be arranged.

824. Is it not very irritating for men to have to come backwards and forwards, and not know what court to go to?—It is a real grievance to the special jurymen, I think.

825. Do not you think that a panel of special jurymen chosen to wait, for example, for three days, and take all cases that came on, would be a better arrangement?—You would require at least for each court 100.

826. Mr. Alderman *Salomons*.] One hundred for the term?—No, for each day; and then from the number of excuses we should have then a difficulty in getting jurymen sufficient.

827. Mr. Alderman *Lusk*.] You do not like the system of panel?—No, I have given a great deal of consideration to it, but I really do not see in London that it would apply satisfactorily.

828. You have been asked before about the special jurymen and the common jurymen; if we take London, for example, there I suppose the qualification might be a little higher than in the county, but do not you think that we might get a good class of men by making them all one class of jurymen?—I think that the cases that come before a jury at Nisi Prius in London are so different that I think it would not apply; one panel might be very inadequate to try causes, and another might be quite adequate.

829. At present who are the people who determine that a case shall be a special jury case?—The parties.

830. Do you think that the attorneys should be the judges on that question or the judge who tries

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tries the cause?—It is a privilege to the parties; and as they pay very dearly for it, I do not see why that should be altered. But they do not get their costs in a special jury case without the permission of the judge.

831. You say that they pay dearly for the privilege; do you mean that the special jurymen are well paid?—The whole process is dear.

832. Do you think that the special and the common jurymen are paid as they ought to be paid?—If it is fit that the common jurymen should be paid, I think that they are not paid sufficiently, but I think that the special jurymen are paid sufficiently, taking one case with another, some of the cases take a very short time.

833. Do you think that to take a greengrocer or a shopkeeper away from his business a whole day, and give him a shilling a cause is an adequate payment?—No.

834. Do you think that a guinea a cause to a special juryman is adequate?—Ten guineas might be a loss to him, but I think that a guinea is sufficient. I think that if a juryman attends a cause, and it lasts more than one day, he should be paid a guinea a day.

835. According to the time occupied you mean, and not according to the cause?—Yes; when a cause is tried it is in the power of the judge to say whether he will allow the costs of a special jury or not; therefore a party is at his peril in some measure by having a special jury.

836. I wish to know if you think that the payment to jurors at present is adequate to the labour they perform, considering the time they wait, and so on?—I have mentioned that I think that the common jurors are paid, not in money, but by experience, and in other ways; therefore I am not in favour of their being paid more; but the special jurors, being selected by the parties out of the two classes, as extra duty, being liable to serve on grand and common juries besides, ought to be paid; and I think that, taking one case with another, a guinea is sufficient for them; sometimes they are not occupied five minutes.

837. On the other hand, I have seen some causes last a week?—Then I would say that those jurymen should have a guinea for each day.

838. In reference to the qualification of jurymen (I do not refer to London, but throughout the country), would you make it a qualification of rental, or rating, or income, for a juryman?—It would be a property qualification in a great measure in the counties. I do not see how they could judge otherwise than on a property rating.

839. But by rating a number of very good men escape altogether, do they not, and you do not get them?—It is so, but I cannot suggest any other mode.

840. Do you think that the present amount is high enough for the qualification, or rather low?—I think it is rather low.

841. Might I ask you whether, from your experience, which is very large, the age of 60 is a good age for exemption?—I would have it 70; but I think that ought to be in the power of the judge, upon application to him; I would fix the age of 60, at all events, but between 60 and 70; it should be at the discretion of the judge. There are many persons between 60 and 70 who are not able to sit the confinement of a length of time. I believe that that was the reason why, when the Jury Act was passed, they limited it to the age of 60, but otherwise in energy and power many persons are fully competent at 70.

842. In reference to exemptions, do you think that it is a proper thing to exempt such an immense number of people as are exempted now?—I think that the exemptions are too great; they include a Commissioner of Income Tax, and many others, Post Office, &c.

843. A chemist, for example?—A chemist is exempt from a safety to the public; I think that in the case of the Post Office it is an exemption that ought not to exist, and many others.

844. You think that the exemptions now are many of them much too wide?—Much too wide.

845. Do you see any reason why clergymen and attorneys should be exempted?—I think that attorneys should be exempt, because it is not for themselves, but for their clients' sake.

846. The Corporation of Trinity House?—I see no reason why they should be exempt.

847. Mr. Alderman *Salomons*.] I heard you say, I think, that jurymen should be all taken by rating; how is it that I very seldom see any director of the Bank of England, or the directors of other companies upon a special jury, how do they escape?—I do not know; you must ask an Alderman that.

848. The list is brought up to us, you mean?—You see that the lists are made out by the ward clerk, but how those lists are made out, I know not; they come before the aldermen and the common council, and they send them to the sheriff.

849. All directors possessed of a domicile in London would probably come on the City lists; but I suppose that directors of companies who are merely directors, although they get their profits in the City, and carry on their business there, would escape entirely?—If you ask me my opinion, I think that they are all liable to serve.

850. But they do not serve because they have no domicile in the City?—It is not necessary to have a domicile; holding a room or counting house for the purpose of trade or commerce is sufficient in London.

851. The question I am asking is this, would not legally all the directors of companies, persons who carry on business in the City, although they have no private domicile there, be liable to serve on juries?—My opinion is that they are all liable.

852. I do not see any of them?—It is not my doing that they do not serve.

853. Mr. *Turner*.] In your list of instructions you say that parties who are competent as grand jurors are to have G affixed to their names, but I do not see any instructions as to what their competency consists in?—No, I have no power as to that.

854. Is that letter G affixed at the discretion of the ward clerk?—He should send in a list of the names of the parties, their qualification, residence, and calling, whatever their business may be; that is his duty.

855. This letter of instructions is addressed by you to the ward clerk, is it not?—No, to the aldermen's deputy and common council of the ward.

856. At the bottom of this paper you quote this resolution of the General Purposes Committee: "That the ward clerk should make out or procure to be made out on his responsibility, a list of all persons liable to serve on juries within his ward"?—But if you read further you

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you will see a reference to aldermen, deputy, and common council of the ward.

857. It says that the list should be revised afterwards by them?—Yes.

858. Then it is not for the ward clerk to put the letter G against the name of a person competent to be a grand juror?—No.

859. As I understand you the persons who put the letter G against the grand juror, are the parties who revise the list, that is to say, the aldermen, deputy, and common council of the ward?—Yes.

860. Mr. Burchell says that he would propose for a special jury, any householder rated at 80 *l.* a year; do your approve of that?—He speaks for the county; in the City I should say that, as the law stands, any one having a room, counting-house, or warehouse, for the purpose of trade or commerce, should be liable for one or the other.

860*. Would you propose any amount of rating to qualify a man as a special juror?—Not for London.

861. Then you would have no qualification for a special juryman beyond the qualification for the common juryman? — The grand juryman should be a person who, in the opinion of the authorities at the ward, was a proper person to be a grand juryman.

862. As regards the grand juror, I understand that that is left to the discretion of the aldermen, deputy, and common council?—Yes.

863. As to the special juryman?—As to the special juryman it is the same; but they return to the sheriff the person as being a banker, merchant, or esquire, or person of a higher degree.

864. That description, you are aware, is a perfectly arbitrary one?—Yes.

865. It amounts to nothing, in short; but you would propose as the qualification, that it should be a substantial qualification for a special juror? —In London it is very difficult, but it must be within the knowledge of the authorities of the ward.

866. Therefore you think that in London the only parties to decide whether a juryman should be chosen as a special juryman should be the aldermen, deputy, and common council of the ward?—I believe that would be the best thing; I believe they know their neighbours, and they know their different wards much better than the parish officers do the parish.

867. You would leave it to those persons to decide which should be grand jurymen, which special jurymen, and which common jurymen?—Yes.

868. I think that the Honourable Member for Dover, asked you whether it would be desirable that special jurymen should be paid each man his guinea when the cause was withdrawn; the difficulty then arose, that 24 were chosen, and it was said that the judge might decide as to which of the 24 were to have the 12 guineas; but in case of the withdrawal of a cause, no jury is sworn at all, is it?—No.

869. Therefore in the case of the withdrawal of a cause, and 12 guineas having being deposited, who is to decide out of the 24, which 12 gentlemen are to get the 12 guineas?—The way that I suggest would be, that the associate should by ballot, just as if the cause were going to be tried, call over the first 12 indiscriminately.

870. You would suggest that the associate should, from the 24 gentlemen who are there, ballot 12, which 12 are to receive the 12 guineas? —Yes.

871. You are aware of this, probably, that if the 24 gentlemen who were there, knew that this was a ballot, not for trying a cause, but for who was to have the guinea, they would all answer to their names; but if it is for the trial of a cause, is it not very common for special jurymen to hang back?—I am afraid it is.

872. Therefore in one case they would all come forward, and in the other case they would hang back to see whether the court could not get 12 names without them?—No doubt, when it was to receive the payment, the 12 would answer to their names.

873. You were asked as to special juries, whether it should not be for the judge to decide? —The judge decides whether he will allow the costs of a special jury; but it is the parties who in the first instance ask for one.

874. That, I suppose, is a necessity of the case, inasmuch as the parties know better whether it is a case requiring a special jury than the judge can possibly do before he has heard the trial?—Yes.

875. Mr. *Whatman.*] Is it not the case, that your practice, in reference to partners in a firm, is to enter the name of only one partner in making the jury list?—In the first book we put down every name.

876. The names of all the partners in a firm?—I am particular in mentioning that because, though by law they are bound to do it, they do not do it.

877. Then am I to understand that the whole of the names of the partners in a firm are actually returned, and put down on those lists?—They ought to be.

878. Do you know whether they are?—In some wards, I believe, they were in the habit of only returning the senior partner, and he might be over age, and that is why I drew their attention to it.

879. It applies to some of the wards, but not to all the wards?—No.

880. Are any of these gentlemen returned for more than one place in the City?—Yes; several of them have different counting-houses in different parts of the City.

881. Are they liable to be summoned accordingly?—They are liable; but if we know it, and if it is within reasonable time, with the sanction of the judge, we do not do it, for I have spoken to the judge before now, and have got the sanction of the judge to that course.

882. Without saying anything invidious to the grand jurymen, you are prepared to consider that the qualification to serve on the grand jury, is not necessarily so high as to serve on a special jury?—A man's being a grand juror depends upon his calling and station in life, and intellect as well as property, and he must be judged by the authorities of the ward.

883. Without saying anything invidious, you consider the duties of special jurymen rather more important than those of the grand jurymen? —A grand jury is very important in the way of criminal matters, because they have to decide whether a party shall be put upon his trial, but the special jurymen are more required in commercial cases, and cases of importance in that way; many of the grand juries we should say are not more competent than the petit jurymen may be for some commercial purposes.

884. In

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884. In practice, does it not frequently happen that when jurymen have been summoned, and have not answered to their names, they have been fined; notice of the fine has then been given them, and although the summoning officer might have discovered that these gentlemen were absent from the house at which the summons was left, yet they can only escape this fine by going before a magistrate, and making an affidavit that they have not received the summons. It has been stated before, however, that it was the duty of the summoning officer to state whether, when he left his summons, he found that the party was *bonâ fide* absent?—At every term of sittings in court, each of those officers who summon the juries is sworn, and then the court, before they fine a juryman, examine this person who has been sworn, and he states how he left the summons, whether with the housekeeper, clerk, or personally. Then if the party should be fined, the associate of the court is bound by law to send a notice to him, and during the sittings in court, the party may come and make his excuse, or, if required, make an affidavit to be read before the judge, and if the judge is satisfied that he should not be fined, he takes the fine off.

885. So that frequently, although the juryman could not possibly have received the summons, he is fined, and put to this apparently needles trouble, in order to escape the fine?—If he doe not wish to be fined, it is so necessarily.

886. If a gentleman from having served often is considered a good juryman, he is frequentl summoned more often than he would otherwis be, is he not?—Yes.

887. So that there is rather a premium o evading it systematically and regularly in th shape of being less liable to be summoned?— I have mentioned before, if the parties like a person, think him a good juryman, and think hin likely to attend, they will keep him on the list; and I believe that there are a great number o men, that the parties would be very glad to hav upon all their causes.

888. What is the number of courts in the City, are there not several?—Only three courts o special juries at a time.

889. Mr. *Huddlestone.*] For next week ther are special juries in the Common Pleas to my knowledge in both courts?—That is an exceptional case.

990. Mr. *Whatman.*] Is there not also some court near the Tower which requires special jurymen?—That relates to Middlesex; I have nothing to do with that.

Monday, 8*th July* 1867.

MEMBERS PRESENT:

Mr. Denman.
Viscount Enfield.
Mr. Freshfield.
Mr. Headlam.
Mr. Alderman Lusk.
Mr. Alderman Salomons.
Colonel William Stuart.
Mr. Turner.
Mr. Whatman.
Mr. Charles Wynn.

VISCOUNT ENFIELD, IN THE CHAIR.

CHARLES JAMES ABBOTT, Esq., called in; and Examined.

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891. *Chairman.*] YOU are Under Sheriff for Surrey?—I am.

892. How many years have you held that office?—It has been very nearly the 100th year in my family.

893. Is it an hereditary office?—No, it is an annual office.

894. The under sheriff, I presume, is appointed by the high sheriff?—Yes, annually; I have not been under sheriff always, that is, not every year, but I have either had the conduct of that office, or I have been actually under sheriff, with one exception.

895. I suppose the way in which special and common juries are summoned has come under your cognizance?—Yes.

896. You heard, I believe, the evidence which was given last week by Mr. Burchell, as to the practice in Middlesex?—Yes.

897. The practice differs in Middlesex, does it not from other counties in England?—Yes, it does.

898. Will you explain to the Committee the way in which special juries are summoned in your county?—When the precept for the assizes comes in, there is a note attached to it. I am speaking of the last 14 years; the names of 48 special jurymen are taken out of the list, and those gentlemen are summoned as the special jury to try all the special jury cases at the assizes.

899. How are those 48 names selected; by ballot or otherwise?—They are selected many of them by me from a sort of imaginary line. I divide the county into three parts, as the assizes in Surrey are held in three places, namely, at Guildford in the summer, and at Croydon in the summer, alternately; and in the spring they are always held at Kingston. I take a large district for Kingston, and then for Croydon or Guildford, and having drawn an imaginary line where the railroads give an easy access to Croydon, to Kingston, and to Guildford, I summon from those districts 48 gentlemen. The jury book is delivered to me, or ought to be, by the 1st of January; then I am bound to take out of it all esquires and men of higher degree, bankers and merchants, and put them into another book, which is called the special jury book; then I have to provide small cards, on which a number is put against the name of each of those special jurymen in the book (there were from one to 900 and odd in Surrey this year) in order that they may be referred to immediately; those cards are then put into a box, and if it is necessary to have a ballot, somebody takes out a card, and then the book is referred to, and it shows the name of the gentleman who is struck; my plan of striking a special jury for the assizes is to take the special jury book and run down through the names of those gentlemen who have not served; and it has been in force now, I think, since the spring of 1853. We have not summoned anybody, except at the last assizes at Guildford, and then it was by accident, or that a gentleman had a different description, or had changed his residence, or something of that sort; we have not summoned anybody, except by accident, more than once during the last 13 years.

900. Have you one panel for all the causes which are tried at the assizes by the special jury?—Yes.

901. After a gentleman has served, is a mark placed against his name, or any other means taken in consequence of which he is not called upon again to serve?—Yes, a list of the whole panel is entered in a book kept for that purpose.

902. With the date at which he has been called upon to serve?—The year.

903. On an average, how often does the same name recur?—It does not recur at all, except upon a ballot.

904. I understood you to say that you selected the names, and that there was no ballot?—In some cases we do ballot.

905. Under what circumstances do you do so?—In a compensation case against a company, to get a good jury for assessing damages, then there is a ballot.

906. The lists are made up, are they not, by the overseers, and sent to your office at the end of the year?—Yes; by the 1st of January.

907. And you select the names of those who shall be special jurymen or grand jurymen?—No, there is no distinction between a grand jury and a common jury; the grand jury for the assizes are selected from the men of note and mark in the county: the magistrates and gentlemen who have served the office of high sheriff, and the members for the county; and members who have contested the county; and the sheriff's own private friends, those constitute the grand jury for the assizes. The grand jury for

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for the Central Criminal Court and sessions are taken from the general body, not from the special juries.

908. Was the system of having one panel to serve for the assizes introduced by yourself?—No; it is under the Common Law Procedure Act.

909. And you believe that it has worked well and given satisfaction?—Yes, it has; some of the jurymen have said that they do not mind serving, as it comes so seldom.

910. Do you think that that system might very fairly be introduced into the county of Middlesex?—I am not so well able to speak upon that; I cannot say, for I have not really thought upon the matter.

911. In your experience, your system in Surrey of having one general panel of special jurymen to serve during the assizes, means being taken so that they shall not serve again for a certain period of time, has, in your opinion, given satisfaction to the public, and has worked well in the administration of justice?—I think it has.

912. Mr. *Denman*.] You have stated that you take 48 names of gentlemen who try all causes; but that is subject to one exception, is it not, that if the parties require a special jury under the old practice, they can have it?—Yes; then it is done by ballot.

913. Does that happen often, or only rarely?—It happens about once in three or four years.

914. The compensation juries, you say, you take on a different principle?—Yes.

915. Do not you sometimes, in taking compensation juries, make the selection according to what you know to be the convenience of the jurors as to residence?—No; the 48 names are taken by ballot, and sometimes I look down the list, and see whether a gentleman is living a very long way off, and if any are living, say, at Frensham, and a case is to be heard at Croydon, it is a long way to come, 45 miles, to attend on a jury, I generally suggest that I do not think that those gentlemen are likely to attend, and constantly the parties take that opinion, and strike out the names.

916. Instead of exercising their own right, they act upon your suggestion, and excuse those gentlemen from attending, but practically they get the requisite number returned for compensation cases?—Yes.

917. You find, I believe, that they do attend very regularly in compensation cases?—Yes; but I think we do not get a full jury so often as we do a short one; we generally get from seven to nine.

918. What is the average number who attend in compensation cases?—About nine.

919. You ballot, then, in compensation cases in the same way that they do for special juries in Middlesex?—Yes.

920. The grand jury at the sessions consists of the common jurymen?—Yes; those who are liable.

921. What determines whether they shall be grand jurymen or not with you?—Those who live in the better class of houses.

922. It is a matter of discretion, then, on your part?—Yes.

923. Is there not a desire to be on the grand jury in order to escape serving on the common juries?—Certainly; the grand jury lasts for one day, but a common jury may last for four or five days.

924. By whom is that done; by you or by any subordinate officer?—It is done by one of my own clerks.

925. During all the time you have held office, have you never had reason to suppose that there was favour shown to common jurymen?—I do not think so; I occasionally look into that, and my clerks know it is very likely that it may take place.

926. But you have not had reason to suspect it on the part of any clerk?—Not on the part of any clerk. I did at one time suppose, I may say fairly, that there was a little palm oil paid to the summoning officer; it was in the case of a special jury, but I have since summoned by letter, under an Act which enables juries to be summoned by letter.

927. How many of the common jurymen do you tick off as grand jurymen on your list?—I summon for the assizes, for the grand jury, about 150.

928. Those consist of the gentry?—Yes.

929. Do not you tick off, in the jury list, certain persons who are at present liable to be summoned on the grand jury, or who are entitled to be so?—No.

930. You make the selection at the time?—Yes, taking them from the different parishes.

931. We have heard that in Middlesex, or in London, the names are marked in the list itself, with the letters G. J., making the parties grand jurymen?—Yes, that is in London.

932. I believe that in Surrey you make it a practice of summoning the special jurymen for the assizes and the common jurymen for a limited number of days, do you not?—We have two panels, generally speaking, for the common jurymen, and they summon one for a week, and the next jury come on and finish the assize.

933. Do you adopt the same system with the special jurymen?—No.

934. One batch of 48 serves through the whole assizes?—Yes.

935. Mr. *Whatman*.] Are the compensation cases usually longer than the cases in which juries, or special jurymen are engaged at the assizes?—No, it takes one day, generally speaking.

936. For each case?—Yes.

937. Do you find that special jurymen who are summoned to the assizes, attend tolerably well?—Yes, there are generally about enough to make two juries.

938. What length of notice do these special jurymen receive for the assizes?—Twelve days, if they are summoned by post.

939. Mr. *Freshfield*.] How many special jurymen have you in Surrey?—There are 968 this year, and there were 888 last year.

940. Am I to understand you to say that from 1853 to 1867 it has never come to the turn of any special juryman as such, at the assizes, to have his name repeated?—With those exceptions that I have given.

941. Except in the compensation cases?—Yes; a list of all those summoned is taken, and if, in searching through the book, a man is found to have changed his residence, and gone somewhere else, then he stands a chance of going down again, and he would very probably go down a second time, but, except by accident, I do not think there has been one; if one of his Christian names has been left out, I might take it to be his son, and summon him.

942. May we take it that a further service on

juries in Surrey does not exceed one in 14 years?—Yes; special juries.

943. How many common jurymen are there?—I suppose there are 24,000 or 25,000.

944. How often are they repeated?—We do not take them oftener than once in three years.

945. You detain them only for a week, do you not?—That is the first list; the second set may be detained very much longer.

946. They serve till the end of the assizes?—Yes.

947. What is the average duration of an assize in Surrey?—A little over a fortnight, I should think on the average.

948. You do not find, do you, that jurymen of either class complain of the service?—The petty jurymen do.

949. Do you see any reason why the same practice should not be adopted in the City of London, of having one panel for the three courts, or at all events for one of the courts, and in Middlesex?—I do not know the working in the City at all, or in Middlesex.

950. Do not you know enough of Middlesex to be able to express an opinion?—No; I think not, because they have four assizes there in the course of a year.

951. You cannot assimilate the practice of the two courts in your own mind?—I do not see why it should not be done.

952. Do you think that there is any special affection in the parties or in the solicitors to have their own nomination of the jury by ballot?—No, I do not know that there is. We are bound to put up the special jury lists seven days before the assizes, so that parties can come and see who are the special jury, and if they dislike them, they can apply for one under the old system.

953. You find 48 special jurymen enough, do you?—I think that if a double panel was summoned to serve on alternate days, it would be a very great boon to the jurymen, both special and common.

954. You do not think that there would be any inconvenience in the arrangements in court in summoning fresh jurymen day by day?—No. In Surrey, for instance, where the assizes last for an indefinite time, if one jury was to serve on Mondays, Wednesdays, and Fridays, and the other on Tuesdays, Thursdays, and Saturdays, there need be no confusion. When a cause goes over more than a day, the jury would then have to come the following day.

955. Mr. Burchell seemed to think that there would be inconvenience in having different juries, and that when you had got a panel there, it ought to be kept?—One panel, certainly, would be more convenient. You would have a fewer number of jurymen, and you would have them all there, at least probably so.

956. You find, practically, that 48 is a sufficient number?—Sometimes they pray a *tales*, and sometimes they are not quite sufficient.

957. *Chairman.*] The qualification for jurymen, I believe, is 20 *l.* rateable value, and 30 *l.* in Middlesex?—Yes; and 10 *l.* freehold.

958. Have you considered whether there would be any advantage in raising the qualification for special jurymen?—No, I do not think so.

959. You think that the qualification is high enough to secure respectability and intelligence?—Yes.

960. You would not be inclined, I suppose, to make any difference in the qualification?—I think I should; I think that perhaps the terms esquire and merchant should be somewhat defined; at present, they are very much undefined; the jurors supply their own descriptions, and the magistrates in petty sessions settle what the descriptions are, whether they are right or not. In Surrey, I do not believe that the overseers or churchwardens do send out any notices at all. In my own parish, there are a great number of gentry; they are gentlemen whom I know who serve on special juries in London and Middlesex; there is not a special juryman in the parish there with 4,000 inhabitants; in another parish, which happens to be the last in the book, there are nine jurymen returned, and one special juryman, and he, I know, has been dead for four or five years; the lists are most imperfect. If I send out to 60 or 70 jurymen, I get back seven or eight letters at least, marked "gone," "not known," or "dead."

961. What remedy would you suggest for that state of things?—I think if the churchwardens and overseers were to be paid, and were bound to send a notice to everyone to fill up, saying what his calling and title are, and that was to be returned, and the overseer was bound to make a proper return, and not merely a copy of the last year's list, which probably was a copy of one perhaps seven or eight years old, you would then get a larger return, a very much better one, and a more perfect one; there being 980 special jurymen, merchants, bankers, esquires, baronets, and knights, in the county of Surrey, it is quite a farce to suppose that to be the full number.

962. Mr. *Denman.*] Does it happen to your knowledge that persons who get returned as merchants and bankers are really not of the class of persons who ought to be on special juries?—Yes, certainly; for instance, there are very many licensed victuallers who return themselves as wine merchants, and there are very many rag and bottle merchants who return themselves as merchants; and potato merchants also.

963. For instance, are there not London tradesmen having villas in Surrey, who are grocers and drapers in London, and would serve on a common jury in London, but are they not sometimes on special juries in the county of Surrey?—Yes; they constantly return themselves as esquires and merchants.

964. How many might there be if properly returned of special jurymen in Surrey?—I think there would be fully four times what there are.

965. Are the common jurors of Surrey liable to serve in the Central Criminal Court with respect to a part of the county?—Yes.

966. Do you know how many common jurors of the county of Surrey are obliged to serve?—There are 10 grand jurymen and 23 petty jurymen.

967. And that would be 12 times a year?—Yes, we summon 396 to the Central Criminal Court every year; 432 to the sessions, and about 384 to the assizes.

968. The Surrey assizes often last, I believe, as long as from two to three weeks?—Yes, they do.

969. And those special jurors travel, do they not, from their own houses frequently by railway to the assize town?—Yes.

970. Have you not sometimes heard complaints made, that in the course of those journeys to and fro, they learn too much about the cases from the attorneys, or the parties who are travelling in the same carriage with them?—I have not heard that, but I think it is very probable.

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971. If they were summoned only for a day, that could not occur?—No.

972. Supposing you had a sufficient number of special jurors summoned to furnish the number you might think necessary, say four times the present number, would there be any difficulty then in getting them to serve only for a day, instead of four days following; would it impose greatly increased duties upon them?—The parties are entitled to have their cause tried by giving me notice the day before the commission day, and constantly there are 50 special jury causes, and of course I could not summon 12 fifties in that time.

973. I do not suggest that you should summon 12 times 50 jurors, but that you should have a rotation of jurors, summoning only 48 for each day of the assizes, would that be possible?—I do not think it would work so well as the plan that I would suggest; that instead of summoning 48, they should summon 96, and let them serve on alternate days.

974. That would be open to the objection, if it is one, that they would be travelling some days before the cause came on with the parties who were going down from day to day to attend the assizes?—Yes; but then they might not be called.

975. It is a matter, however, upon which you have not thought very much?—No.

976. Nor have you heard any great complaints on that score?—No.

977. Mr. *Whatman.*] When you suggest one day's service, is that with special reference to the railway accommodation, and other facilities for travelling in Surrey?—No, it is merely on this ground, that it would lighten the work for the jurymen. There are great complaints made by the common juries that sometimes they may be taken for 10 days away from their homes, and they get 8 *d.* a cause only.

978. Mr. *Denman.*] On the home circuit in Surrey, what do you give to a common juryman when he serves on a special jury as a *tales*?—They are entitled to only 10 *s.* 6 *d.*, but, generally speaking, they get 1 *l.* 1 *s.*

979. Mr. *Whatman.*] Referring to persons who are qualified to serve as jurymen, are the lists generally made up by the overseers of the respective parishes?—The way in which it is done is this: the clerk of the peace sends out a precept to the churchwardens and overseers of every parish, then they make out a list, which they put on the church doors the first three weeks in September, then they send in a list to the magistrates in petty sessions the last week in September, and then that list is settled by the magistrates in petty sessions. This (*handing in the same*) is the common jurors' book for Surrey, and that is the special jurors' book (*handing in the same*).

980. These books are made out from the lists that are sent to you?—Yes. (*The different entries in the books were explained to the Committee by the Witness.*)

981. *Chairman.*] Is there any mark in these books to show when a man has served?—No; but I search for every man's name to see when he has served, and how long ago.

982. Mr. *Denman.*] I see this entry, "Holmwood, in the parish of Dorking, William Atkinson Langdale, Esq.;" is he not an attorney?—Yes; and he is practising now, but he was not practising a little time ago.

983. He is placed in the special jury list?—Yes; because he is returned as an esquire.

984. Would he be summoned to attend?—No, because I know that he is an attorney; he would get off.

985. There is nothing in this book, is there, to show the cases in which the parties are excused?—Nothing at all.

986. Mr. *Whatman.*] Are not the magistrates in petty sessions supposed to revise these lists?—Yes.

987. Mr. *Headlam.*] I think you say to begin with, that the original jury list is defective?—Very much so.

988. And that a great many persons of all ranks and classes are omitted from it?—Yes; a great many.

989. After having got the general jury list, you take the special jurymen according to the description that you find in the general jury list?—Yes, of bankers, merchants, esquires, and men of a higher degree.

990. You think, do you not, that there ought to be a much greater number taken out of the general jury list to serve as special jurymen?—If the returns were properly made, I am confident that there would be a much larger number.

991. Would you make the distinction more precise between special jurymen and common jurymen?—No, I think the distinction is sufficient at the present time, if the magistrates had some particular line to go by, as to what constitutes merchants and esquires.

992. Take the case of an esquire, does not that depend chiefly upon the man himself, and whether he chooses to call himself an esquire or otherwise?—Many gentlemen who really are esquires return themselves "as gentlemen," and then they get summoned on the grand jury for the quarter sessions, and that exempts them. They serve one day for two or three hours.

993. But the description is adopted by a gentleman in order to meet his own views, and he calls himself "esquire" or "gentleman" just to suit his own convenience?—Yes; that is, if he makes any return.

994. Do you not think it would be better that there should be some precise description which should make a man a special juryman as contradistinguished from a common juryman?—Certainly, if merchants, bankers, and esquires were properly defined; the magistrates sitting in quarter sessions know almost everybody in their own particular district, and they could soon ascertain whether a gentleman was an esquire or a merchant.

995. It has been suggested to the Committee, that in lieu of this description, there should be a precise rateable value of the house; do you think that that would work better?—I do not think it would, for many a man takes rather a good house and lets it out in lodgings.

996. You could not suggest any better description than the one which exists now, only you would desire to see it a little more strictly carried out?—Yes, I do not know why a gentleman who keeps a carriage and a pair of horses, should not serve on a special jury, living in the country.

997. Would it not be rather difficult to define it in that way?—No, his return would show it.

998. Practically, the result would be, would it not, that you would make a greater number of special jurymen in the county?—Yes.

999. And you think that that is desirable?—Yes, certainly, if they could be summoned for a shorter time, or to serve every other day, or for every two or three days, it would lighten their work

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work so much. It does not signify so much, particularly to a special juryman, to be taken from his business for one day, because he has clerks and other persons who are able to conduct his business for him, so that if he is away for one day, it is much less inconvenient to him than if he were away for 10 days.

1000. Supposing the number of the special jurymen was increased, the number of the common jurymen left would be to that extent diminished, would it not?—No; because I believe that there is a great number who are not put on. I believe the lists to be copies of the last seven or eight years' lists.

1001. If the list was more accurate, and you got all the special jurymen that you required, you think there would still be left quite an abundance of common jurymen?—Yes.

1002. Are you of opinion that any hardship is imposed upon the common jurymen in the county of Surrey?—Yes, I do think that there is very great hardship; very little for the special jurymen, but very great hardship is put upon the petty jurymen.

1003. Would you not increase that hardship by diminishing their number?—I do not believe that their number would be diminished.

1004. If you take a greater number out of the general list and make them special jurymen, must not that diminish *pro tanto* the number of the common jurymen?—No; if the return made was a good and *bonâ fide* return there would be considerably more than 24,000 jurymen in Surrey; there would probably be 48,000; in the eastern division we have nearly 11,000 voters; they are not all living in the county, certainly.

1005. If you had your list completely right of all the jurymen, and by attending particularly to the qualification of special jurymen, you increased their number, you would of course diminish the number of the common jurymen?—Certainly, if the return was not larger from its being more perfect; I believe that the number would be nearly double.

1006. As matters are, you think that the hardship is considerably upon the common jurymen?—Yes.

1007. In addition to that, is not the hardship considerable also upon the special jurymen?—No, I do not think it is so much upon them.

1008. Is it not a hardship upon a man to be summoned for a cause when it is uncertain when it will come on?—No; when they are summoned on a panel of 48, it does not signify whether the cause comes on or not; they are to try all the causes.

1009. And that system answers in Surrey very well, does it?—I think it does.

1010. I think the improvements you would suggest are greater accuracy in the formation of the whole list to begin with, and then greater accuracy in the selection for special juries?—Yes.

1011. Have you anything to suggest with regard to grand jurymen?—No; I think they are very useless, except perhaps for the assizes.

1012. With respect to such special jurymen as were not summoned, would you allow them to fall into the common jury list?—No.

1013. You think that they should be had altogether?—They will serve in their turn.

1014. If a man did not serve for a long time in consequence of the number upon the special jury list, you would not make him liable to serve on common juries?—No; but I do not see why a criminal, if he chooses, and if the judge thinks fit, should not be tried by a special jury.

1015. That would be having a special jury to try a criminal case?—Yes, they might be summoned; we do not in Surrey, summon the special jury for the first two or three days, generally speaking. The Commission day being on Monday, a special jury is summoned for Thursday; they might be summoned for Tuesday; there might be cases in which gentlemen and men of some distinction might be falsely accused, and they might like to be tried by a special jury.

1016. It has been suggested to the Committee that it would be a good thing to have a mixture in common juries, of persons in a superior station in life, and that persons who having been summoned on special juries, had not served, should serve upon common juries; do you think that there would be any advantage in that?—No; I think that when there is a *tales,* and a common juryman is called in, it is somewhat like class against class, they do not work together so well. I believe that when a jury is locked up, they more frequently do not agreee when there is a *tales* than when there is not.

1017. There would then cease to be any distinction between the two; they would have fallen into one general list and serve, being taken from a mixed list of special and common jurymen without any distinction?—Still the one would be entitled to serve on a special jury.

1018. Would you make any difference in the qualification on the jury list?—No.

1019. You would neither make it higher nor lower?—I do not think so.

1020. Mr. *Freshfield.*] Do not you think that there are cases, criminal cases, for instance, in which a jury would be better constituted if it were composed of a better class of persons than common jurymen alone, taken apart from a crown jury?—Certainly.

1021. Do you see any mode by which that could be effected?—Yes. I do not see why a criminal should not be tried by a jury taken out of the special jury panel for the assizes. There is but one panel of common jurymen, and they serve as they happen to be called.

1022. That does not include the special jurors?—No; but I do not see why they should not serve, out of 48, in the criminal court as well as in the civil court.

1023. Would you give that as a matter of right, or as a matter of special favour?—I think it should be on the application of either of the parties, with the sanction of the judge trying the case.

1024. I think you suggested that it would save some of the inconvenience to which common jurymen are exposed, if they were to be summoned for a shorter period than they summon them for now, a week?—Yes.

1025. Do you think there would be any difficulty in summoning them for a day, or two or three days?—Only this, that you cannot tell what the length of an assize will be at all; it is quite impossible to say, because so many causes go off, and so many causes are referred, and so on. Sometimes an assize which looks as if it would be very long, is very much shorter; you really never can tell how long the cause list may last. The jurymen are entitled to 10 days' notice, and if we summon more than two lots, it is very probable that the third lot will not have to serve at all; and if we were to summon them for three or four days, in Croydon it happened in

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1863 that the Commission day was on the 3rd of August, and the assize finished on the 31st, so that it lasted just about a month.

1026. The evil seems to be the detention of the list for a long period; might not that be obviated in another way, by having a larger list, and letting the jurymen go and return every other day?—Yes; and that is really what I wish to suggest, that they might serve on alternate days.

1027. Do you see no inconvenience that would be caused to the sheriff in that case?—No; we summon 144 always, and if one set were summoned to serve on Mondays, Wednesdays, and Fridays, and the other set on Tuesdays, Thursdays, and Saturdays, I think there could be no mistake about it.

1028. You think that it would greatly abridge the inconvenience to the common jurymen?—Yes; for instance, a barber, or a small farmer, or a butcher may come to me, and say, "My wife is ill, and there is no one to attend at home to my shop, and I must shut it up."

1029. The evil appears to be in the continuance of the absence;—Yes; and it is a very serious inconvenience to a small farmer in the summer time to be absent 10 days from his farm.

1030. Mr. *Denman.*] You could do that by the existing law, could you not, by arrangement, without violating any law?—It might be done; and if the judges would tell me to do it, I would do it. I apprehend that it might be done.

1031. Mr. *Freshfield.*] Might not that also be applied to special jurymen?—Yes; and instead of summoning 48, I would say summon 96; they would have to come a little oftener.

1032. You think it would be an abridgment of the inconvenience which they now suffer?—Yes, a very great one.

1033. Do you think that, consistently with what extension there might be of number, there would not be an increase of service?—Yes; there are nearly 1,000 or 960 special jurymen now, and if we summon 200, they would come about once in four or five years.

1034. You think that there might be an area of 4,000?—Yes, fully that.

1335. *Chairman.*] Have you considered the question of exemptions, the number, and the positions of the classes who are exempt from serving as jurymen?—Yes; and I think they are quite ample.

1036. Are they not too ample?—Yes; there is one set that I think I should not be inclined to exempt, and those are commissioners of income tax.

1037. Mr. *Denman.*] Do you find, as a matter of fact, that the names of the magistrates appear in a smaller proportion on the jury book than the names of persons who are not magistrates?—I will not say that, because I think that the special jury list is one-fourth less, or at least, it is less, and considerably less than it ought to be; I think that if a proper return was made, instead of there being only 1,000, it would be about 4,000; I do not think that the names of magistrates are out to that extent, but it so happens that I see a good number of magistrates' names who come on when they are first appointed, and then gradually they certainly do vanish from the lists.

1038. Suppose that a magistrate is exempt by law, it follows, of course, that he will be aware of his own exemption?—Certainly.

1039. Do you find that magistrates are not so anxious to be called esquires and bankers as other people?—In our own county it does not happen; there is no advantage to the magistrate to be returned as a gentleman, because you cannot summon a magistrate to attend as a juryman in his own court at quarter sessions; the advantage to a juryman of being returned a gentleman is, that he gets summoned, if he lives in the country, to the quarter sessions; for example, if he lives in the neighbourhood of Kingston, he is summoned to serve on the grand jury at Kingston, that takes him about three or four hours in the month of October, and then he is free for three years.

1040. *Chairman.*] Are there any other classes of persons who you think ought not to be exempted besides commissioners of income tax?—I have really not gone into that question.

1041. Sixty is the age at which exemptions commence; do you not think that that is a little too early?—No, I think not; if a gentleman wishes to get his name off, 60 is not too early, in my opinion.

1042. Mr. *Denman.*] Have you any parishes in ancient demesne in Surrey?—Yes, there is one.

1043. Do you consider them exempt from providing jurymen at the present time?—Yes; I think Seal and Tongham are exempt; I have heard that pleaded at quarter sessions.

1044. And has it been admitted?—Yes, by the chairman.

1045. Mr. *Whatman.*] Have you many privileged persons in Surrey?—I think not.

1046. Do the magistrates generally in Surrey act as general and additional commissioners of income tax?—Yes, I believe they do very much; I think it might be a good thing if the common jurymen were paid a little better than they are now.

1047. *Chairman.*] With regard to the remuneration to special and common jurymen, have you any suggestion to make to the Committee?—I think that special jurymen are sufficiently remunerated.

1048. But you think that is not so in the case of common jurymen?—Yes; a common juryman gets 8 *d.* a cause, which may last a whole day. There are 72 summoned, and they are to attend for a certain time; at the beginning there is the first lot, and the second lot are to finish the assizes; it may happen that one man may not have to go into the box at all. They receive 8 *d.* a cause, and 8 *s.* is the amount of the fee that is paid. Then again, if judgment goes by default, the damages are to be assessed before the sheriff, and when the damages are assessed before the sheriff, the common juryman's fee is 4 *d.*, and I do not think that that is sufficient remuneration for him. I have always thought that if they had each 5 *s.* a cause, or something of that sort, it would be better, and I think that it ought to be paid in advance. There are many cases in which, if the parties do not succeed, they go off, and they never pay at all.

1049. How do you suggest that that payment should be made, out of the county rates?—By the litigant parties; and I think it would have this beneficial effect, that it would put an end to a very great number of little speculative actions, which are undertaken by attorneys, who live by getting up actions; for instance, we always have a crop in Surrey of little actions for assaults at public houses, trespasses, and various minor things, slanders, which might just as well be settled in the county court; I think that if an

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an attorney had to pay down the sum of 3 *l.* out of his pocket, it would very much deter him from bringing these actions, and I think that it would lead them to go to the county court, instead of to the assizes.

1050. Colonel *W. Stuart.*] Is there any record of the time when that small payment of 8 *d.* first was established?—I really do not know.

1051. Mr. *Denman.*] When you say that you think the money ought to be paid in advance, what would be practically a convenient mode of doing it; do you mean that when the cause is entered, it should be deposited with some officer who should pay it to the jurymen?—I think that now we have to collect, that is, the sheriff, has to collect fees, because the judges say, that it is not a very decorous thing that they should be collecting fees, and therefore the sheriff does it; when the panel is taken away, if they paid it to the sheriff, it would do.

1052. Would you pay it at the rate of 5 *s.* a man to those who served, or would you make a common fund and distribute it equally among the jurymen?—I should prefer the latter mode; because on the criminal side they get nothing. I would distribute equally among those who were attending.

1053. Mr. *Freshfield.*] Would it not be better that the special jurymen should be paid by the sheriff in advance, apart from any duty performed in order to secure that they should be paid?—I think that they almost always do get it, at least, I do not remember a case in which the special jurymen have not got it.

1054. Are they not sometimes called into the box, and dismissed without being sworn, and do they not go without their fees?—I do not think that I ever remarked that. Personally, I should object to that, because very likely panels might be taken out in 50 or 60 special jury cases, and I should have to take down with me to the assizes between 500 *l.* and 600 *l.* for that purpose alone, and I would rather not do that.

1055. There is no assize town without a banker?—No; but I should be obliged to open an account with him.

1056. Mr. *Denman.*] It does not unfrequently happen, I believe, that the record is withdrawn in special jury cases, and in that case the jurymen do not get their fees?—Yes, that does happen, and sometimes a verdict is taken by a common jury in order to save the 12 *l.* 12 *s.*

1057. Mr. *Whatman.*] When these gentlemen are summoned in the way you described for the whole panel, would it ever happen that the same special jurymen would get paid for three or four trials on the same day?—Yes; one special juryman told me that he made as much as 30 guineas on one assize.

1058. Have you found the number of civil cases at the assizes to increase very much of late years?—Yes, very much so.

1059. Can you give the Committee any idea how much they have increased, and at what rate?—Eighty cases used to be a very long list, and now we have them over 200.

1060. Are they still increasing?—No, not still increasing; we had 208 cases once, but that has not occurred for some years.

1061. As far as you can see, there is no reason to apprehend that the labour of jurymen will be greatly increased by the greater number of causes which will come to the assizes to be tried?—Yes, I am afraid they will.

GEORGE WILLIAM KELLETT POTTER, Esq., called in; and further Examined.

G. W. K. Potter, Esq.

1062. Mr. *Headlam.*] I DID not hear your evidence on the last day, but, I believe, you complain of inaccuracy in the original formation of the jury lists?—I think that they might be better returned.

1063. Do you think that there are a considerable number who are legally liable, but who are returned in the general jury list?—I think that many are not returned.

1064. With regard to the persons who are selected from that general list to serve as special jurymen, is there in like manner any inaccuracy or irregularity in selecting them?—I think so.

1065. Would you make any in the qualification for special jurymen?—In London, as I have said before, it must depend a great deal upon the knowledge of the parties; that is to say, a person may be a merchant, but yet he may not be a merchant possessing sufficient knowledge to be put on a special jury. Many merchants carry on only a very small business, and they may not be competent to serve on a special jury; that point is left to the authorities of the ward in London; they judge of the competency of the party to serve on a special jury.

1066. You would make it rather a question of individual competency?—Yes, and the possession of sufficient property as well.

1067. Would it, in your opinion, be an improvement if, instead of a man being qualified because he was a merchant, a banker, or an esquire, he should be qualified by the occupation of a house of a certain rateable value?—I think not in London, because in London a person holding a room or two rooms may be very competent to have a very large business, and be fully competent to serve on a special jury, whereas a person who holds a house might not, by the mere possession of property, be so eligible.

1068. Am I right in supposing your opinion to be that special jurymen should be selected from the list of general jurymen, upon the principle of individual competency, and a certain property qualification?—With regard to the City of London, the way in which I should answer that question is this, that the individuals are returned by the aldermen and common councilmen of the ward; they generally know, or they can learn, who the persons are who are fitted and competent to be returned as special jurymen. I do not think that property alone should be the criterion as to a man's qualification for a special juryman; but if a person is known to have had large experience in commercial matters as a merchant, he is a proper person to be returned.

1069. Does it not at present depend very much upon the description that a man gives of himself?—That I cannot tell, as it does not come within my department as to the return that may be made.

1070. Would you alter the qualification for a juryman, referring to the general jury list?—I think not; not in London.

1071. With regard to summoning the special jurymen, would it be an advantage if they were summoned in any different way from that which is the practice now?—I know of no other plan that is better.

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1072. Would it not be an advantage if they were summoned to serve for a particular time, say, for a week?—I think not in London, because the business there is so different, and I may also say even in Middlesex, from what it is in the counties. A person may have to come a great distance in the counties, and there the plan might be well, because they might remain during the time of the assizes, and lodge in the town where the assizes were held; but in London they are supposed to be on the spot engaged in business, and it would be a very great inconvenience to merchants to be detained long from their business; they complain now of several days. In compensation cases, we have no complaints whatever; the cases are appointed to come on, and the parties attend.

1073. Would it, in your opinion, be better if the special jury list were larger than it is now?—I think so.

1074. Do you think it might be made larger without inflicting any hardship upon individuals?—Yes, and with great improvement as to the public. Colonial brokers, insurance brokers, shipowners, and many others might be added, and they would be of great use, being men of great experience in compensation matters, they would be very useful as special jurymen.

1075. Probably greater accuracy in the formation of the list would bring a much greater number of persons on to it?—Yes; and the law might be altered in regard to the qualification.

1076. Do you mean by extending the qualification as to merchant, banker, or esquire?—Yes; at the present time there are exemptions as to serving upon special juries.

1077. Would you make any alteration as to those exemptions?—The exemption from serving on special juries is principally as to age, but I think the exemptions are too many.

1078. With respect to those persons on the special jury list who do not serve on special juries, would you mix them up with the common jurymen?—They are; the special jurymen are taken from the whole list under certain conditions, and therefore not only are they liable to serve as grand jurymen, but as petty jurymen, quite independently of their serving as special jurymen.

1079. Do they in practice ever serve on common juries?—Yes; I have seen special jurymen among common jurymen in the box, having been summoned for another court at the same time.

1080. Would you make any difference as to the grand jurymen?—The grand jurymen have but little to do in London, except as to the Central Criminal Court, and then they only summon 12 times in a year, and then only about seven jurymen each time.

1081. Mr. Alderman *Salomons.*] I think the number is eight?—The words are, "a sufficient number," and I think it is seven or eight.

1082. Would you make any difference in the payment made to the common jurymen?—I have said before that I should not; I have not heard of the common jurymen complaining as to not being paid; and I think from the advantages they may have, and the short time they are required to attend, because they are required only for 36 days in the whole year for Nisi Prius and the Central Criminal Court, I have not heard them complain.

1083. Do they not complain of the special jurymen being paid, and of their not being paid?—The special jurymen have been taken out of the whole panel, and it being an extra duty, they look to be paid.

1084. Would you make any difference in the payment made to the special jurymen, or would you have the fee paid at an early stage of the cause?—I think I would; I think it would be a very good plan that 12 guineas should be placed in the hands of the officers of the court, or the sheriff, and then for an officer of the court to ballot for 12, and then that those 12 should be paid, at all events.

1085. Mr. *Denman.*] Have you any notion that in the City of London persons do not serve by reason of various exemptions, commissioners of income tax, and so on?—Yes.

1086. Do you find that, owing to the large number of persons who, in your judgment, are qualified to be special jurymen, including colonial brokers, shipping brokers, and insurance brokers, taking the average of the London common juries, they stand very high in point of intelligence?—A common jury in the City of London is sometimes a very good jury; I do not think I would alter the qualification, or lessen the number of qualified persons.

1087. Do you see any very great difference between the intelligence of special and common juries in the City of London?—Yes; many of the common jurymen are retail dealers, and they do not possess a sufficient knowledge of commercial or shipping matters, and therefore they are not so well able to serve on special juries.

1088. Mr. *Whatman.*] I think you suggest that a good many colonial, insurance, and other brokers, who do not appear on the list should be put upon it?—Yes.

1089. How would you get at the names of those persons; at present the list is supposed to be taken from the ratepayers, is it not?—The authorities of the ward when they looked into the list would know; they would judge of them, and having power by law to name those parties, they would probably do so.

1090. Mr. Alderman *Salomons.*] I was this morning on duty at the Central Criminal Court, and my attention being directed to the composition of the juries, I observed that there was a pawnbroker and a licensed victualler among those who were returned to the grand jury; does that depend upon you or upon the list?—It depends upon the list that is sent to me entirely.

1091. How could we obtain a return of the number of persons who are fined for non-attendance on any jury, and also the number of those who actually pay the fines?—I could give you a return, as I keep an account of every one who is fined, and returned by the long writ. I could not tell as to every one who is fined, for frequently during the sitting of the court, the parties apply to get the fines remitted, and they are remitted. Of those who have been returned by the long writ, I could give you an account of the number of fines taken off.

1092. Have you found out the mode by which persons who are fined evade the payment of the fines?—It is done by application to the court during the sitting of the court, or by affidavit after the court is broken up, and they get the fines remitted.

1093. Could we obtain a return of the number of persons who are fined, as well as of those who pay them?—Yes; I think it possible from the officer of the court.

HENRY POLLOCK, Esq., called in; and Examined.

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1094. *Chairman.*] You are Associate in the Court of Exchequer?—Yes.

1095. How many years have you held that appointment?—Fifteen years.

1096. Has your attention been called, either officially or otherwise, to the way in which special and common juries are summoned and attend in Middlesex?—Yes, it has, during the whole of that period.

1097. Will you favour the Committee with your views as to whether the present system is a good one; and if not a good one, what remedy you would suggest to make it perfect?—I have had, during all the time I have been associate in the Court of Exchequer, to listen to the complaints of jurymen; and as far as I have heard complaints from special jurymen, they are as follows: the short notice that they have telling them they must attend; the great number of summonses they receive, often being summoned to be in two places at the same time; that they often receive no notice when a cause has been settled, although it may have been settled two or three days before they were summoned to attend the court; that they get no payment then, that is, when the cause has been settled sometimes beforehand, or in another case, which they think much harder, when it is settled on the day of trial, and sometimes after the jury are in the box, the record is withdrawn, and the jury get no pay.

1098. These are complaints on the part of special jurymen?—Yes; some of them would be common to both; but I am now only speaking of special jurymen; lastly they complain of the unfair mode of summoning them, which may be divided into two heads; first, that there are a great number of persons who ought to be on the list who are not on it, and consequently they are not summoned; secondly, that the number who are on the list, and who ought to be summoned, get off by some underhand means, or in plain language, that somebody is bribed. I should say, as to these complaints, taking them in the order in which I have mentioned them, and first, the short notice that is given, that the notice has become less and less, and that under the Common Law Procedure Act, if it was followed, or the Judges' Rules which were made shortly after the passing of that Act, that cause of complaint would not exist at all; but in practice both the Common Law Procedure Act, and the Judges' Rules are not attended to. I can refer to one of the Judges' Rules, as I have them in my pocket, if the Committee desire it; and to the clauses in the Common Law Procedure Act.

1099. If you please?—There is a clause in the Common Law Procedure Act of 1852; it is 112th section of 15 & 16 Vict., which says, "Where notice has been given to try by special jury, either party may, six days before the first day of the sittings in London or Middlesex, or adjournment day in London, or commission day of the assizes, give notice to the sheriff that such cause is to be tried by a special jury;" the following part of the section is the material part: "and in case no such notice be given no special jury need be summoned or attend, and the cause may be tried by a common jury, unless otherwise ordered by the court or a judge." It has often occurred to me that if the special jurors knew that, they might refuse to attend, and claim it as an exemption; but I do not believe that a single special juryman whom I have ever met was aware of it. Then, shortly after that Act was passed, the judges made this rule, which I read from "Judges' Rules, Hilary Term, 1853"; it is the 45th Rule: "No cause shall be tried by a special jury in Middlesex or London, unless the rule for such special jury be served, and the cause marked in the Associate's book as a special jury cause on or before the day preceding the day appointed in Middlesex and London, respectively, for the trial of special juries." In point of fact, sometimes nearly half the special juries are marked as such after the day mentioned in the Judges' Rule, and now it comes to be quite a matter of course that either the plaintiff or the defendant gets a rule for a special jury at any time, and this has led, I should say, to a great deal of inconvenience; then as to the complaint of the frequency, and the number of the summonses, and of having to attend in two places at once, and of no notice being sent when a cause has been settled, it occurs to me that the whole of these complaints could be got rid of by having a panel of special jurymen, common to all the special jury causes, as was suggested by the Common Law Commissioners, at whose suggestion the Common Law Procedure Act was passed; in that Act they have provided for such a panel in the country, and if their ideas had been carried out, the same law would have been provided for London and Middlesex.

1100. Do you suggest that there should be one panel for each of the three superior courts, or one panel to embrace the whole three?—I should suggest one for each court, and for this reason, that all the courts sit at the same time, and the three officers in the three courts, or it might be in six courts, would be calling special jurymen at one and the same time; and unless there was something in the summons sent to a juryman to inform him as to which court he was to go, I think it would lead to very great confusion. It would be also, I think, an advantage to the juryman, for this reason, that it is the practice of the judges, when they see that they have a long case, which is likely to last the rest of the day, or for any other reason, as for instance, if they have to rise early, to let the jurymen go as soon as they can; and if there was but one panel common to all the courts, all that the judge could do in one court, would be to say, that the jurymen would not be wanted in that court, but they must wait and attend, if required, in other courts. I think it would be the least trouble for the courts and for the jurymen, if there was a separate panel for each court, adopting the practice which already prevails with the common jurymen, of borrowing special jurymen if there was any lack from the other courts: for instance, if there was a lack in the Court of Exchequer, to send into the Common Pleas for some of the special jurymen there. With regard to the time that they should serve, that is a matter upon which it is very difficult to come to a conclusion. I should suggest not more than three days, from conversations that I have had upon the subject with many special jurymen.

1101. Mr. Alderman *Salomons.*] Do you mean three consecutive days?—Yes, two or three. If this plan was adopted, it would be necessary to alter the present practice as to the panel. Ac-

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cording to the present practice it is the business of the attorney, before he brings the record to the associate, to annex a panel of jurors to the record, and if the plan suggested was adopted, the panel might change after the record was lodged with the associate. I should, therefore, suggest that it should be the duty of the associate to annex a panel at the time when the cause is called on. Then it would have to be the duty of the sheriff to supply the associate with panels. As to payment, there being none when a cause is settled, either before it comes on, or when it is settled after the jury are in the box. I should suggest that for many reasons, apart from the mere payment of jurors, it would be a convenient thing if half the fees to the special jurors were paid when the cause is marked for a special jury, at the associate's office, and the other half at the trial, as it is now; so that, if either party wished for a special jury, they would have to pay down something. A great many people who obtain a rule for a special jury and afterwards settle their cause, now give the jurors quite as much trouble, and I should say in many instances more than those who actually try their causes by special juries, for, the causes that give the most trouble to special jurymen, are those which are frequently postponed, and those are the most frequently settled. I do not think it would be difficult to have a jury fund, which should be equally divided amongst the panel at the end of the three days, or whatever other time it was settled that they should serve. I should suggest that the Judges' Rule, as far as plaintiffs are concerned, would be an excellent one to adhere to, or that a plaintiff should not be allowed to make a cause a special jury cause after the first day of the sittings, which would be granting them one day more than accord-according to the Judges' Rule. I may say that even at that time the plaintiff must have had at least 10 days to consider whether the cause should be a special jury cause or not, and he must have given 10 days' notice of trial to the other side. I should suggest that defendants should not be able to have a jury later than the first two or three days of the sittings; for in the same way, a defendant must have had the same period of 10 days to consider the matter. For a defendant is never certain, until the cause is actually entered, that the plaintiff is in earnest, and I would therefore give him a little longer. I believe that that is all I have to suggest as to special jurymen, except as to the unfair mode of summoning, and as to some people being omitted from the list, and the question of bribery. I would rather put off anything I have to say upon that until I come to the question of the common jurors, because the remarks upon that would be equally applicable to both.

1102. Mr. *Denman*.] That is as to one portion of the matter, people being not summoned from favour or corruption. As to the other point, that a sufficient number of persons are not put on the special jury list, you might have a special case as to that which does not apply to common juries?—I think so.

1103. There is a case applicable only to special jurors; I refer to the complaints made by them, that other persons who ought to be on the special jury list are not upon it?—Yes; that would apply only to the question of special juries, and, I think, it would come better afterwards; I have with me some lists from the City, and I also have some information that will answer a question, which was put before I was examined, about fining, and, I think, that that would also come in better when speaking of the mode of making out the lists, and summoning the jurors; I will now go to the complaints made by the common jurymen, and the principal complaints which I have heard are the following: the length of time they have to serve, which is often five or six weeks at a time: the wholly inadequate payment they receive, which, in Middlesex, is 1 *s.* a cause, and in the City of London 8 *d.* a cause: the unfair division of labour: a point which again resolves itself into two, that is to say, the lists are not properly made out, first from neglect, and secondly, that those who are on the list get off improperly, and I think that these are the only complaints that the common jurors make; I do not know whether I should be right in making any suggestion to the Committee as to whom they should examine, but it seems to me that the only way in which you will get to the bottom of the question of the lists, will be by examining the parish officers; and I would suggest to the Committee that they should take at least two parishes, and begin with the churchwarden, whose duty it is nominally to make out the lists, but who, being an unpaid officer, has, I believe, in practice, nothing to do with it; I am now only speaking from hearsay, and you should then examine everyone, down to the very officer who delivers the summonses. I should say, as to the length of time for which the juries have to serve, that that could easily be got over by having a fresh panel once a week, or oftener; and here again I should say that, I believe, under the Common Law Procedure Act, as it at present stands, there is power to do that, although it has never been acted upon; I may refer to the 107th clause of the Common Law Procedure Act of 1852, which enacts how a jury shall be summoned, "The sheriffs of London and Middlesex respectively shall, pursuant to a precept, under the hand of a judge of any of the said superior courts, and without any other authority summon a sufficient number of common jurors for the trial of all issues in the superior courts of common law in like manner as before this Act; and seven days before the first day of each sittings a printed panel of the jurors so summoned for the trial of causes at such sittings shall be made by such sheriffs, and kept in their offices for public inspection; and a printed copy of such panel shall be delivered by the said sheriffs to any party requiring the same, on payment of one shilling" (this part of the clause has, I believe, hitherto made the other part inoperative, even if it had been suggested that it should be acted upon); "and such copy shall be annexed to the Nisi Prius record; and the said precept shall, and may be in like form as the precept issued by the judges of assize; and one thereof shall suffice for each term, and for all the superior courts; and it shall be the duty of the sheriffs respectively, to apply for, and procure such precept to be issued in sufficient time before each term, to enable them to summon the jurors in manner aforesaid; and it shall be lawful for the several courts, or any judge thereof, at any time, to issue such precept or precepts, to summon jurors for disposing of the business pending in such courts, and to direct the time and place for which such jurors shall be summoned, and all such other matters as to such judge shall seem requisite." Then there is another section in the Common Law Procedure Act of 1854, the 59th, in these terms, "The several

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several courts, or any judge thereof, may make all such rules or orders upon the sheriff or other person, as may be necessary to procure the attendance of a special or common jury for the trial of any cause or matter depending in such courts, at such time and place, and in such manner as they or he may think fit." It appears to me that those sections give the judges absolute power, and if they liked now, they could summon common juries as often as they pleased. If this was adopted the associate would have to annex a panel to the record, as I suggested in the special jury cases, and for the same reason. I should suggest that the Middlesex and London lists should be amalgamated, as I suppose they must be when the new courts are finished. The present accommodation in the City is wholly inadequate, and I suppose that when the new courts are finished this must be done. I should also suggest that certain exemptions which exist now should be abolished; viz., all those exemptions which are exemptions by prescription, or by charter. I am not able to give the Committee a list of them; the only one that has at all commonly come under my notice is that of the Barbers' Company. I do not think I have any other suggestions to make, except as to the lists.

1104. *Chairman.*] What notice, in your opinion, would be ample to give to a juryman, in order that he might not be put to more inconvenience than was necessary?—I should suggest eight days; not less than eight days.

1105. In the event of a cause being withdrawn for which he has been summoned, what is the sort of notice that is sent to him, or is it done at all now?—That depends upon the courtesy of the particular attorney, but very often notice is not sent.

1106. I think you stated that great complaints were made occasionally, on account of the withdrawal of a cause not being notified to the jurymen?—Yes, very great complaints. I believe that in the greater number of cases no notice is sent; but I have made a point for some years past of suggesting to the attorney that he should send a notice, and it is sometimes acted upon.

1107. You suggest, as I understand you, that a conditional notice should be sent?—Yes.

1108. The fee as we know is at present a guinea to a special juryman for a cause, and I understand you to suggest that half a guinea should be deposited when a cause is marked as a special jury cause?—Yes.

1109. And that half is to be paid to the jurymen, supposing that they are not called upon to serve?—My suggestion is that there should be a common fund if there was a panel, but if the present system remains as it is, I would suggest that half the fees should be paid to the jurors on that particular panel.

1110. With regard to the inadequate remuneration to common jurymen, have you any suggestion to make as to what, in your opinion, would be sufficient?—As to that, I believe that if you made it 2 *s.* instead of 1 *s.* it would make a considerable difference in the contentment of the juries.

1111. To be paid in advance?—At present it is not paid in advance. During some terms and the sittings after, the jurors agree at the beginning of the term to make a common fund, and it is divided at the end of the term among those whom I tell them are entitled to it. I know exactly whom has served, and whom has not, and I give them a list. Of course it is not done officially; it is merely done to oblige the jurors, but the more frequent practice is for the jurymen to be paid at the end of each day for the work that the particular jurors have done.

1112. As to exemptions, I think you stated that all exemptions of bodies should be removed; have you considered the number of individuals who are now exempt, and whether their number might not be reduced?—I have a list of those who are now exempt here.

1113. Do you think that that list might be reduced with advantage?—No. There is only one class of persons about which I have any doubt, and those are commissioners of property and income tax.

1114. They are exempted?—Yes.

1115. Is the age of 60 too early an age for exemptions to commence?—I think it is.

1116. To what period would you extend it?—To 65, leaving it open to jurors, as it is now, of all ages to be exempted upon the production of a certificate of inability to serve from any cause.

1117. As to the way in which the lists are now made out, you would, I think, rather not speak upon that subject?—I am perfectly willing to suggest how I think they should be made out.

1118. Will you favour the Committee with your opinion upon that head?—Before doing so there is one other thing that I should mention, and that is as to the payment made to the common jurors. I have received a suggestion from some of them (and I think it would be a fair thing), that they should be paid more when they are trying the causes of people who live a long distance from Middlesex or London, and who might try their causes on circuit. I received a suggestion signed by two or three jurymen to that effect the other day.

1119. Now, with regard to the lists, what improvement do you think could be made in that way?—I should suggest as to the lists, that it should be all done by post, and that you should not have personal deliveries of summonses, or personal visiting of houses, because you must employ people in a rank of life whom you cannot expect on all occasions to refuse bribes. I should suggest that papers should be sent by post, like assessed tax papers, with a compulsory answer to be made in the form of a declaration, and that these should be sent to everybody whom, taking the rate books, would be in a position to serve as jurymen, and that every such person should be required to state what his *status* in society is; then that the lists for the jurymen should be made from such papers, separating them into grand, special, and common jurors. And the summonses should also be sent by post. I would here refer to the Jury Act, which gives power to send summonses by post, but I believe this has never been adopted either in London or in Middlesex. It is hampered with a very troublesome mode of doing it, which I would suggest should not be insisted on in any new enactment. I have here the means of showing the Committee by analysis, how imperfect the lists are now. I have here an analysis of five recent panels in the order in which I called them; consecutive panels. As the Committee know, there are 24 special jurymen summoned in each case. I may say, that it is the practice for a juryman, if he has some valid excuse to offer, to come to the court, or send a messenger. The associate then examines the juryman, or his messenger, and if he is satisfied that he is speaking the truth, the practice is, not to put him upon his oath, but to

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to say, "You need not wait," and let him go. If the associate, on the other hand, has any doubt, he appeals to the judge, and then the juryman is put upon his oath. I find in the first case that six jurymen were excused by me; two were dead, and to four the summonses had not been delivered at all, as the parties were not known at the addresses. Three were fined 10 *l.* for not attending, and nine served in the box. In that case, all the jurymen, except three, who could attend, did attend.

1120. When did that particular case happen; in the present year?—It was a day or two ago, and nine clear days' notice in that case was sent to the attorney. In the next case the jurymen were summoned on the 28th of June, for a trial that was fixed for the 4th of July, and six out of the 24 were excused by myself; to four the summonses were not delivered, because the people were not known at the addresses, or had gone away; six served, eight were fined 10 *l.* each, and out of those eight four sent most excellent excuses, and the fines were remitted; and it is probable that in three cases out of the other four they will also be remitted. In the next case the jury were summoned on the 4th of July to attend on the 5th of July; the cause did not come on for trial on that day; the record was withdrawn on the 6th of July; and in that case four of the summonses were not delivered, because the people were not known at the addresses. The jury complained bitterly that they did not get their fees.

1121. Mr. *Denman.*] Was there a full jury present?—I cannot tell, as they were not called. In the next case the jury were summoned on the 3rd of July for the 4th of July. In each of the cases I have referred to I should have said that the attorneys had had ample notice. The jury was summoned on the 3rd of July, and the attorney had had eight clear days' notice, and it was his fault that the jury had so short a notice; the cause was tried on the 6th of July; four of the jurymen were excused by me; one of them was dead; and to four the summonses were never delivered, as the parties were not known; 12 served, and there was a full special jury in that case; three were not accounted for, and did not answer when their names were called. In the next case they were summoned on the 29th of June for the 5th of July, and they were summoned four days after the attorney had had notice; one only was excused by me in that case; five summonses were not delivered, as the parties were not known; 12 served, and one attended, but was not wanted; five were not accounted for. That I think shows that there are 25 per cent. of the jurymen whose names are upon the panels annexed to the record who are nonentities; about 12 per cent. are either dead or gone away, and as many are excused upon good reasons being shown; they are either abroad, or are in the country; that is to say, they have gone on a journey to the north of England, or something of that sort, or they are ill; it also shows that the jurymen attended very well indeed. I have not made the same kind of analysis in Middlesex, but as a proof that the jurymen attend well there, I may mention that during the recent sittings, in one case there were 15 jurymen fined, and out of those 13 have been excused their fines upon grounds of excuse about which there could be no doubt, and a great many of them on affidavit. In the second case 16 were fined, and 14 of the fines have been remitted; in some cases the people were dead. In the third case 14 were fined, and 12 were excused.

1122. What particular advantage do you think would be gained if the lists were delivered by post as compared with personal service?—I think that it would entirely put an end to bribery, or any attempt at it.

1123. *Chairman.*] Have you any other suggestions to favour the Committee with?—I do not think that I have.

1124. Mr. *Denman.*] Suppose you were to summon jurors by post, how could you fine them for non-attendance; what proof would you have of the delivery of the summons?—I have thought of that, and I think it may be met, as it has been already met, in an Act of Parliament to which I have referred.

1125. To which Act do you refer?—It is the 25th and 26th of Victoria, chap. 107, section 11. At first sight it seems to be making a great change, and I should have hesitated to suggest it; but one is so much in the habit in courts of justice of seeing people made answerable for very much more important things than attending upon a jury, on account of letters merely proved to have been sent by post—for they are assumed to have received all letters which have been correctly directed and posted—that I thought it would not be unreasonable to make the onus of proof rest upon a man that he did not receive the letter, if there was good proof that it had been posted to his correct address. The 11th section enacts, "Any person liable to serve on any jury may be summoned as heretofore, or in the manner following; that is to say, the sheriff or other proper officer, may make out a summons and affix the seal of his office thereto, and such summons having the words "jury summons" legibly written or printed on the same side as the address may be sent open by the post, prepaid, and directed to the person so required to serve as juror, at his place of abode, as described in "The Jurors' Book," which said summons, together with a duplicate, endorsed with the name and address of the juror to whom the original summons is directed, shall be taken to the postmaster of any post-office where money orders are received or paid, within such hours as shall have been previously agreed upon at such post-office, and under such regulations with respect to the registration of such summons, and the fee to be paid for such registration (which fee in no case shall exceed two-pence over and above the ordinary rate of postage), as shall from time to time be made by the Postmaster General in that behalf; and in all cases in which such fee shall have been duly paid, the postmaster shall compare the address of the said summons with that of the duplicate, and on being satisfied that they are alike, shall forward the summons to its address by the post, and shall return the duplicate to the party bringing the same, duly stamped with the stamp of the said post-office; and the production by the party who posted such summons of such stamped duplicate, shall be evidence of the summons having been delivered at the dwelling-house of the person whose name and address is thereon endorsed, at the place mentioned in such endorsement, on the day on which such summons would, in the ordinary course of post, have been delivered, provided it shall appear that the same was not returned by the post-office as undelivered."

1126. Does that Act apply to all juries?—This Act

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Act applies everywhere except in Scotland, Ireland, and the City of London.

1127. Do you find that that Act is acted upon at all?—I am not able to say as to the country, but I think in Middlesex it has never been acted upon.

1128. Do you think that the judges would act upon it to the extent of fining parties, subject to their obtaining a remission of the fine if the proof was given that that Act requires, or would the judges hesitate to fine a man unless they had affirmative proof of the delivery of the summons?—I have no reason to believe that the judges would hesitate to act upon it.

1129. Are the judges generally aware of the existence of that Act?—I do not think they are; but it has nothing whatever to do with the judges; it refers to the sheriff.

1130. You say that the common jurymen are paid 1 *s.* in Middlesex, and 8 *d.* in London; does that depend upon any statute or upon custom?—I believe it depends upon ancient usage in both cases.

1131. It is not mentioned in the Jury Act, the 6 Geo. 4, or in any other Act, is it?—I cannot answer that question from memory, but my impression is that it is alluded to in this way, that they shall be paid as heretofore.

1132. You say that you have heard complaints made by jurymen of the neglect to place others on the list, and as to the remuneration which they ought to be paid?—Frequently.

1133. And also that there has been unfair play?—Yes.

1134. Have you had many such complaints made?—Yes, a great many.

1135. Have you taken pains, at the time, to trace these matters out, so as to be able to form a judgment as to whether there was any foundation for these complaints, or not?—I have.

1136. Have you satisfied yourself that there has, or has not, been frequently just grounds for these complaints?—My belief is, that there have been just grounds for them, but I also believe that many complaints are without the slightest foundation.

1137. Have you sometimes so traced matters out as to come to the conclusion that they are mere idle stories?—I have, but I should say in fairness, that I have never been able to get nearer than this. Jurymen have come to me, and told me that they have got off by bribing, but when I have attempted to go into the circumstances, in any particular instance, I have never been able to get at facts that I could bring forward; I have tried to do so for some years, but always in vain.

1138. Have these complaints been often made to you?—Yes.

1139. Has there been more than one such admission made on the part of jurymen, that they themselves have been parties to such a transaction?—Yes; but it has been said in this sort of way, jurymen have said that they could tell me if they would.

1140. Does that apply to special jurymen, or to common jurymen?—To common jurymen principally.

1141. But you have never been able to obtain such evidence as to feel quite certain that a conviction could be obtained if the matter was followed up?—I have never been able to get evidence that would even justify me in bringing forward a serious complaint. I should state that my opinion has been formed upon information given to me, and which at the time was given to me as confidential information. A man has been complaining very much, and telling me something like this: "Speaking of my neighbours, I could if I liked tell you all the circumstances, but I will not; it would be a most disagreeable thing to do; but I tell you that it exists, and it ought not to exist." That is the kind of information I have received.

1142. Have the parties ever mentioned any names?—No; I never could get a man to mention the names.

1143. What is it that induces you to say that, on the whole, you feel confident such cases do exist, and that if their was evidence they might be traced out?—Because in two instances jurymen have told me that they have got off themselves in that way.

1144. You gather from that fact, that a man would not accuse himself of such an act?—In these particular instances, the expression of one man was, "To tell you the truth, I am ashamed to say that I have done it myself; it is a common practice."

1145. These were common jurymen?—Yes; I wish to mention further, with regard to sending letters by post, that the next section in the Act of Parliament to which I have referred, makes it the duty of the officer of the court that, whenever a fine is imposed, the person fined shall be informed of the fact by a letter sent; I have had to send a great number of such letters, and I never knew an instance yet of a letter miscarrying.

1146. From the complaints, or rather the confessions of the kind you have referred to just now, where do you suppose the wrong doing to be; in the summoning officer?—In two totally different places; in the first instance, there is a man, he does not want to get his name put on the list at all, and I have reason to believe, merely from what I have been told, for I have no personal knowledge of it, that in some of the parishes the list is very much left to the beadle; it goes very low down, to the deputy beadle, or the deputy-assistant beadle; he goes from house to house, and that man is not pure and immaculate, and the name never appears on the list; that is one way. The other way is, when jurors are to be summoned, and especially common jurors, I believe the practice is to send out 100 summonses, and out of those, as only 60 jurymen are ultimately to be produced, so there is a strong temptation placed in the way both of the summoning officer, and the juror to get off the duty; on the part of the summoning officer to accept a bribe, and on that of the juror to give it. I may add, that I know personally some of the summoning officers, and those whom I have come across I have every reason to believe are men who would not accept bribes, but I believe that their work is very often done by deputy.

1147. Whose deputy would the beadle be; the churchwardens or the overseers?—I am again only speaking from hearsay, but I believe that in some of the parishes the person who really does the work is the vestry clerk, who is a paid officer, and he settles the way in which a great many of the parish matters are done.

1148. He is generally an attorney, is he not?—I believe he is, but this is not at all within my own knowledge.

1149. The vestry clerk is acting for the overseers and churchwardens?—Yes.

1150. He sets their machinery to work for them?—Yes, he does their work. I believe neither of them are paid officers.

1151. You

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1151. You have called the attention of the Committee to certain sections in the Common Law Procedure Act, which, as I understand you, give the judges powers at present which are sufficient for the purpose of having a fresh common jury at reasonable intervals to avoid the necessity of keeping them for six weeks together; have the judges ever acted upon that?—Never; there is a difficulty; for the clause is this: "A printed copy of such panel shall be delivered by the said sheriffs to any party requiring the same, on the payment of 1 *s.*, and such copy shall be annexed to the Nisi Prius Record." So at present it is necessary for the attorney to annex a panel to the record, and that requires to be altered, so that it should be the duty of the associate to annex the panel to the record, and it should be the duty of the sheriff to give to the associate the panels. At present the sheriff gets 1 *s.* for every panel, and as there are many causes, and that is part of his proper payment, some provision, I suppose, would be made to compensate the sheriff for that.

1152. Does the judge at the present time issue any precept at all?—He does.

1153. At the beginning of each Nisi Prius sittings for London and for Middlesex?—I understand that the practice is this: the sheriff in Middlesex, or the secondary in London, writes out a precept, and they may go to any judge; a judge at chambers, I believe, usually signs it, and that gives them authority to summon as many different panels of jurors as are necessary for the coming term and sittings after term.

1154. According to the Common Law Procedure Act, there is nothing to prevent that same sheriff from coming to another judge of the same court for a fresh panel?—Nothing.

1155. From time to time, or every three days?—No; under the 59th section of the second Common Law Procedure Act which I read, power is so given; and perhaps, even as it stands, the judge could of his own will do away with the annexing of the panel by the attorney, for it is in very general terms.

1156. You say that the only case of exemption by prescription, or charter, in London or in Middlesex, is that of the Barbers' Company?—It is the only one that I have often had brought before my notice; I have taken no note of others.

1157. What is the claim that is generally made; exemption from special or from common juries?—From common juries.

1158. Do the exemptions apply more to the one than to the other?—They are claimed more as to the common juries, but, I believe, they apply to both.

1159. Mr. *Whatman.*] Have you any reason to suppose that any parish collectors have to do with the making out of the lists of jurors on the part of the parish officers?—I have not any reason to suppose that they are so employed.

1160. Many of the fines that are imposed for non-attendance on being summoned to serve on juries are remitted, on affidavit, are they not?—They are; the Act of Parliament supposes that they shall be all remitted on affidavit.

1161. In many of those cases is it not the fact that the excuse made is that the person was absent when the summons was served or left at his house?—I think that that is the most common ground of excuse, that the juror never saw the summons until after the cause had been tried.

1162. Is not that a fact that would be within the knowledge, or should be within the knowledge, of the officer who leaves the summons?—I do not see how it could be; I am afraid not; I think it would not do to excuse people upon the mere statement at their own houses that they were absent.

1163. It is often the case, is it not, that the house of the person who is summoned is shut up?—Then that man would not be fined, because it is part of the duty of the summoning officer to state that the house is shut up. When jurymen do not attend it is the duty of the summoning officer to be present, and he hands me this; this is his original list (*producing the same*); he is supposed to swear to it; and I find here against the name of the first juryman, "personally"; that means, that he personally served him; the next is "clerk"; that means that he served his clerk, and so on; then comes "Not known"; when fines are imposed I should omit sending any notice to a man returned as "Not known"; the next is, "Left in office"; he would be fined if he did not attend; then in another case it is, "Gone away"; that person would not be fined; then "Not known," and so on. This is the reason why I suggest the use of the post; the summoning officers are not persons in a condition of life to be allowed much discretion.

1164. Mr. Alderman *Salomons.*] With regard to special juries, you say that the judges have made rules as to the period when they should be summoned before a cause is tried; is that so?—Yes.

1165. Then would not a summons that happened not to be in accordance with those rules furnish a very good ground for exemption?—That is rather a difficult question to answer.

1166. Supposing a man not to attend, and it turned out that he was only summoned the day before, would not that be a fair ground of exemption?—That is allowed in the country; no man is bound to attend unless he has had two clear days' notice; in London and in Middlesex there is nothing specific in the Act; it has only been a question of what is reasonable notice, and the judges decide upon that; I have known it held sometimes that very short notice is reasonable notice.

1167. With regard to the attendance of jurymen, is there not a very long interval between the notice that a man receives informing him that he has been fined, and the time when he will have to pay that fine?—That depends upon the time of year when he is fined. The practice heretofore has been not to send in the estreat until the beginning of the following term; so that if a man were fined now, he would not pay until November.

1168. Would not a more summary mode of enforcing the fine imposed upon parties for non-attendance make them more inclined to attend than they are now?—I believe it would.

1169. From what fund is the money derived with which the common juries are paid 1 *s.* in Middlesex, and 8 *d.* in the City?—There is no fund. It comes out of the pocket, at the moment, of the plaintiff's attorney, and he gets the money from his client with his other costs, in the usual way.

1170. You seem to think that a great deal may be done by sending notices through the post instead of by personal service?—I do.

1171. A man might be summoned by post, and if he did not attend, he might receive notice that he was fined; and would it not be better to have a summary mode of making him pay his fine?—Yes; what I have suggested to the Committee is quite

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uite in outline; if I were to go into more detail, would occupy a very long time.

1172. A great many persons do not attend, be- use they are not regularly fined, and they more asily get off when there is a considerable inter- al between the infliction of the fine and when it as to be paid?—Some of the common jurors ever attend.

1173. Mr. Alderman *Lusk*.] Do you know ow many special jury trials there are per an- um in the four superior courts?—Not at the oment. I can obtain that information in a ort time.

1174. Have you any idea how many special urymen there are in the United Kingdom?— one whatever.

1175. I suppose there is a list of all the bar- sters who practise?—Yes, in the Law List.

1176. Have you any idea of the number of arristers who practise?—Not without referring the Law List.

1177. The number is very considerable, I sup- ose?—Yes.

1178. Do you think that they ought to be alto- ether exempted from serving on juries?—I think at those who are actually practising should be xempt, and also those who have practised.

1179. Is there also a list of attorneys?—Yes.

1180. Have you any idea how many attorneys ere are?—Not without referring to the Law ist.

1181. I suppose their name is almost legion? -There are a great many.

1182. Have you any idea of the number of lergymen in the Church of England?—No.

1183. There are, I believe, about 20,000; do ou know that?—There are a great many.

1184. Have you any idea of the number of issenting ministers there are?—No.

1185. You know, I presume, that the number very large?—I think it is.

1186. Medical men are in very large numbers? -Yes.

1187. Do you consider that the administration f justice is a very important matter for the well- eing of the country?—Yes, most important.

1188. Do you think it is right that all the ducated men should be entirely exempt from erving on juries?—I do think that all those men hom you have mentioned should be exempted, nd for good reasons.

1189. Why should a clergyman be exempt ore than a merchant?—For the same reason at a medical man should be exempt. First of ll, he is liable to be called upon in most impor- nt emergencies; he may be wanted at a mo- ent's notice, and he would often not be in that ame of mind that you would wish him to be , when called upon to decide a case.

1190. Would not the frame of mind of an ttorney be very good?—No, it would be almost s bad as that of a judge, or an officer of the ourt; he would be an expert.

1191. It seems to come to this, that the edu- ated classes are not proper men to be jurors, nd that the ignorant classes are the best fitted r jurors?—I think that the special jurors would e very much surprised if they were not called lucated men.

1192. But those whom we commonly call the lucated classes, you say, are not adapted for urymen?—I think that those who are exempted the educated classes are not.

1193. But you have not given any reason why, for example, a clergyman should be exempted more than anybody else?—I think they should be exempted for the sake of those people who do serve; clergymen have to do with matters of education, and to give attendance upon schools; I think it is a choice between two evils, and that it is choosing the least to exempt them.

1194. They are only engaged on Sundays; why should they not take their turn as jurymen, as well as other men?—I think they are engaged every day of the week.

1195. So are all business men?—But they are engaged upon matters that can be done by deputy. A clergyman cannot depute his work, or, if he did, the curate might be summoned also.

1196. I think you stated that, in your opinion, the pay of the jurymen was very much less than it ought to be?—Yes, of the common jurymen.

1197. Do you apply the same remarks to the special jurymen?—No.

1198. Do you think that the pay of the special jurymen is at all in proportion to the work they have to do?—I think it is not at all adequate to it. At the same time, I think you must look at what is practicable.

1199. Do you think that 1 *s.* a case is fair pay for a common juryman?—No, it is quite inadequate.

1200. Is a guinea a day sufficient for a special juryman?—I think it is much better payment to a special juryman in proportion than what is paid to a common juryman.

1201. Do you think it is fair remuneration to a man who has to count on his business, and attend for three or four days?—I think that the pay to the jurymen does not consist only of the money which they receive in the box, but I believe the merchants and common jurymen in a body save a great deal of money in litigation by their attendance in courts, and learning what they do learn there.

1202. Mr. *Freshfield*.] You have stated that special jurymen very often complain of the short notice they receive?—Yes.

1203. The attorney has of course an interest in securing the services of a jury if he can?—I think that he has an interest in giving as short a time as possible.

1204. Does he not postpone the matter in the interest of his client?—I only speak of an attorney as the agent of the client. I assume that in all instances the attorney is doing the best he can for his client.

1205. It so often happens that causes go off that there is a disposition rather to delay the summons in the interest of the client, in order to save expense?—If I was an attorney, I should give very short notice, but I do not think it is fair to jurors.

1206. You say that jurymen complain that they have so many summonses; that, I suppose, would be cured by having the list increased in a certain degree, and which it might be by having a proper number put on the list, which is not apparently so now?—No doubt, and also by going through the whole rota; I forgot to recommend that no man's name should be taken out a second time until all the other jurymen's names had been taken out.

1207. Do not you think that the present system is a very bad one which permits of names being thrown back into the box after they have once been selected for juries?—Yes.

1208. Might

H. Pollock, Esq.

8 July 1867.

1208. Might not that be cured by throwing the names, which had been once selected, into another box?—Yes.

1209. You say that jurymen also complain of the unfair mode of summoning them, but that, I suppose, we shall be better able to find out when we examine the overseers and churchwardens?—I think you should examine the officers of at least two parishes.

1210. You also stated that the common jurymen complain of the inadequacy of the payment made to them; do you agree in that?—Yes; I think that the common jurors are the persons who have the most real causes of complaint; both have grounds of complaint, but the common jurors have the greatest.

1211. You would say that 2*s.* a cause should be allowed?—Yes; I put that down as something better than 1 *s.*

1212. All things considered, you perhaps think that 2*s.* would be enough, the litigants being also considered?—That is a very difficult question to answer.

1213. You have also said that the jurymen complain of the length of time they have to serve but you think that may be obviated?—Yes entirely.

1214. Mr. *Charles Wynn.*] With regard to duplicate summonses for different courts, is there no way of avoiding that?—Yes; I think so.

1215. You think that there should be one lis and a panel for each of the superior courts?—Yes.

1216. The Committee has been informed that a man might be summoned for every one of the three courts?—Yes, and he is frequently; it often happens.

APPENDIX.

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APPENDIX.

Appendix, No. 1.

PAPER delivered in by Mr. *T. W. Earle,* 24 June 1867.

App. No. 1.

RETURN of the Number of SPECIAL JURY CAUSES tried in the COURT of COMMON PLEAS during the last Ten Years.

YEAR.	MIDDLESEX.	LONDON.	TOTAL.
1857 - -	22	38	60
1858 - -	17	40	57
1859 - -	23	55	78
1860 - -	30	53	83
1861 - -	26	58	84
1862 - -	26	71	97
1863 - -	29	70	99
1864 - -	36	67	103
1865 - -	30	93	123
1866 - -	51	66	117
TOTAL - -	290	611	901

T. W. Erle, Associate.

Appendix, No. 2.

PAPER handed in by Mr. Serjeant *Pulling*, 24 June 1867.

LAW AMENDMENT SOCIETY.

REPORT of the SPECIAL COMMITTEE on the Preservation and Amendment of TRIAL by JURY.

App. No. 2.

YOUR Committee have held numerous meetings, and examined several witnesses officially and otherwise conversant with the working of the existing law affecting trial by jury. Amongst others, T. W. Erle, Esq., Associate of Her Majesty's Court of Common Pleas; William Burchell, Esq., the Deputy Under-Sheriff of Middlesex; E. K. Potter, Esq., Secondary of the City of London; —— Avery, Esq., Clerk of Arraigns at the Central Criminal Court; and Henry Crompton, Esq., Clerk of Assize on the North Wales circuit; and have received many valuable suggestions from gentlemen of high standing in the legal profession.

The House of Commons having, on the motion of Viscount Enfield, now appointed a Select Committee "to inquire and take evidence as to the law and practice relating to the summonsing, attendance, and remuneration of special and common juries, and to report to the House as to any alterations which ought to be made therein."

It seems to your Committee that much good may be done by their at once reporting the result of their inquiries, so far as appears to relate to the subject of this reference, in order that such report may be submitted to the Select Committee of the House of Commons.

Your Committee therefore now beg to report:

1. That having inquired into the law affecting the qualification and liability of persons to serve as jurymen, and the practice relating to the registration of such persons, and securing their attendance in performance of the duties of jurymen, your Committee are of opinion that the existing law is extremely defective, and that the efficiency of our system of trial by jury is in consequence very seriously impaired.

That the theory of that system is that every case should be tried by a jury impartially chosen from among the peers or equals of the litigants, and that the labours of jurymen should be evenly spread over all classes of society.

That in practice common juries in this country are composed of persons from a very narrow social sphere, and that a very large portion of the educated classes are practically excused from taking their share as jurymen in the administration of justice.

By the existing law the qualification for jurymen and the liability to serve are thus settled: With certain exceptions all male natural-born subjects, between 21 and 60 years of age, are qualified and liable to serve, who possess freehold or copyhold property of the value of 10 *l.* a year, or who are leaseholders or rated householders to the value of 20 *l.* a year. There are several deviations from this rule. Thus in Wales three fifths of the English qualification suffices. In the county of Middlesex the household qualification consists in being rated to the amount of 30 *l.* a year. In the City of London all occupiers, whether householders or not, who are assumed to possess real or personal property of the actual value of 100 *l.* in all are qualified. In other cities, which are counties of themselves, the ownership of 40 *l.* worth of property suffices; and in the local courts of ordinary corporate towns all the burgesses are qualified and liable to serve as jurymen. Persons otherwise qualified and liable to serve as jurymen are by law exempt from serving who are peers, judges, clergymen, Roman Catholic priests (having duly taken and subscribed the oath and declaration required by law), ministers of any congregation of Protestant Dissenters whose place of meeting is duly registered, and who follow no secular occupation except that of schoolmaster, and take the oaths and subscribe the declaration required by law. Serjeants at law, barristers at law, advocates of the civil law if actually practising, attorneys, solicitors, and proctors actually practising. Officers of the Courts of Law and Equity, and of the Admiralty and Ecclesiastical Courts, if actually exercising the duties of their respective offices; coroners, gaolers, and keepers of the Houses of Correction, and subordinate gaol officers, members and licentiates of the Royal College of Physicians in London, members of the Royal Colleges of Surgeons in London, Edinburgh, and Dublin, and apothecaries certificated by the Court of Examiners of the Apothecaries Company, if actually practising as physicians, surgeons, or apothecaries respectively; registered pharmaceutical chemists, officers of the navy and army in full pay; the master, warders, and brethren of the Corporation of Trinity House of Deptford Stroud, and their clerks, officers, and servants; pilots licensed by the Trinity House of Deptford Strond, Kingston-upon-Hull or Newcastle-upon-Tyne, masters of vessels in the Buoy and Light Service employed by either of these corporations. Pilots licensed under any Act of Parliament or Charter for the regulation of pilots; household servants of Her Majesty, Commissioners of Property and Income Tax, officers of the Post Office, officers of Customs and Excise, sheriffs' officers, high constables, parish clerks, officers of the rural and metropolitan police, and also all persons exempt by virtue of any Act of Parliament, prescription, charter, grant, or writ.

By the existing law, therefore, persons not qualified by the ownership or occupation of lands or houses are ineligible, and of these a very arge proportion of the better educated are exempt from serving. But by the practice, which will be presently referred to, of excusing from serving as common jurymen, all who can get themselves so designated in the jurors' book, as to make them eligible to serve in the grand jury, or as special jurymen; the class left to serve on common juries consists principally of farmers in the rural districts, and shopkeepers in towns; and by uries thus composed must all criminal cases be tried, and all civil cases which are disposed of in the regular course of law without a special jury. Your Committee deem it of importance to notice also another serious defect in the law upon this subject, namely, the omission sufficiently to provide for the exclusion from the jury lists of persons of proved bad character. The 6 Geo. 4, c. 50, s. 3, in terms disqualifies those who have been attainted of treason, or felony or convicted of any crime that is infamous: but the law does not disqualify persons convicted of offences technically lower than felonies. There is no preliminary objection to the convicted keeper of brothels or gaming houses, the swindler, the fraudulent banker, broker, trustee or agent, the dishonest bankrupt, or those who have been convicted of bribery and corruption. Such persons may, in ordinary cases, be excused from serving, at the option of the parties litigating, but it must frequently occur that the necessary information to sustain the objection is wanting at the time.

The machinery furnished by law for the registration of jurymen is as follows:

In every parish, except within the City of London, or county of a city, the lists are directed to be made out in every year by the churchwardens and overseers in alphabetical order, with proper columns, containing the names in full, the place of abode, the calling or business and qualification; and these lists being fixed on the church-doors for the three first Sundays in September, have to be submitted to the justices of the petty sessions of the district, and, being signed by them, are returned to the quarter sessions; and the clerk of the peace is required to make out from these lists, in alphabetical order, the jurors' books for the ensuing year. The exception with regard to the City of London is, that the lists are altogether made out and settled without any previous publication or notice by the officers of each ward; the ward clerk, with the sanction of the alderman and the common councilmen of the ward.

In practice, the lists so made out, are very defective. It has been proved, to the satisfaction of your Committee, that the law which requires a new jurors' book to be made up every year is properly not observed, the old book remaining in use, with a few hasty corrections, for a great many years; that names which ought to be omitted remain in the jurors' book for years after their qualification or their liability has ceased; that names which the law requires to be inserted are, year after year, altogether omitted, and that persons are in a very large proportion of cases improperly described in the jury lists; and in the jurors' book, as esquires, bankers, or merchants; and by that means are selected only for the special jury lists, or to serve on the grand jury, who ought to serve on the common jury.

The mode of calling on jurymen to serve, and the rotation of service are also settled by law.

The duty of selecting the jury and returning the panel devolves upon the sheriff and his subordinate officers, and except that those who have already served as jurymen are excused from further service for a given time, there is a very great discretion given to those who have to make the return. It appears to be the general practice in the different sheriffs' offices, altogether to excuse from serving as common jurymen, not only persons who have already served, but all those who are merely on the special jury list, or who are marked G., or otherwise, as grand jurymen, a practice which seems to be in no way warranted by law.

To make up a common jury, the jurors' book is gone through in a certain rotation by the hundreds or wards, or otherwise in alphabetical order, omitting the names of all who are marked for special juries, or the grand jury, and a sufficient number of names being given, summonses are entrusted to the summonsing officers on whose discretion in serving the summons, and in returning excuses, &c., it must depend whether the persons selected are ultimately made to serve or not. The officers actually engaged in this business are in most instances very inadequately remunerated for the work the sheriff has legally to perform; and complaints are continually made that very gross irregularities take place with respect to the issuing and service of summonses; that the officers are unduly influenced in the discharge of their duty, and that they receive money for excusing from service as jurymen; that whilst some jurymen are vexatiously summoned others contrive altogether to avoid serving.

Your Committee have had no opportunity of inquiring into the justice of these very serious charges, but the very fact that they are made seems to prove that the present state of things is altogether unsatisfactory.

Your Committee have now adopted the following resolutions with a view to the amendment of the law affecting jurymen:

1st. That there are a large number of persons fit to serve on juries who at present are excluded from the jurors' book, by reason of their not possessing the qualifications prescribed by law.

2nd. That it should be a legal disqualification for the office of juryman, that the person had ever been convicted of crime, or fraud, bribery, or corruption.

3rd. That the machinery now provided by law for making out the jurors' list, should be discontinued.

4th. That in lieu thereof the machinery for making out and publishing and completing the jury lists, should be assimilated to that by law

App. No. 2. provided for making out and publishing the lists of voters.

5th. That a reasonable allowance should be made out of the county or borough rates to every person attending as juryman, whether in civil or criminal business, but that in all civil cases tried out of the district in which the cause of action arose, this allowance should be paid by the litigant, who caused it to be tried, unless the judge should otherwise certify.

6th. That no person should be so excused from serving on a common jury, by reason of his being on the special jury list unless he had actually served.

7th. That special juries should be, in all civil cases, tried in the metropolis and elsewhere, regulated by the Common Law Procedure Act.

8th. That in all criminal cases it should be competent for a judge of one of the superior courts to order the jury to be taken altogether or in part from the special jury list on such terms as may be deemed reasonable.

9th. That the qualifications of grand jurymen both at the assizes and the quarter sessions should be specified by law.

10th. That the jury lists and jurors' book should specify the true description, title, quality, calling, or business of the jurymen.

11th. That some provision should be made for compelling the sheriff to summon the jury from the body of the county, instead of pursuing the present practice of taking the jurymen either in alphabetical order or from particular districts.

Alex. Pulling, S.L.,
Chairman.

Adelphi,
18 June 1867.

Appendix, No. 3.

PAPER delivered in by Mr. *Potter*, 1 July 1867.

INSTRUCTION to the Deputies, Common Council, and Aldermen of the City of London, relative to Special and Common Juries.

App. No. 3.

Secondaries' Office,
20 & 21, Basinghall-street,
Sir, 10 November 1866.

IN pursuance of the statutes 6 Geo. 4, c. 50, and 25 & 26 Vict. c. 107, you are hereby required to return to this office, on or before the Fifteenth day of December next, a list of persons in your ward qualified to serve on juries in London.

The qualification by the 6th Geo. 4, c. 50, is being "*a householder or the occupier of a shop, warehouse, counting-house, chambers, or office for the purpose of trade or commerce, within the said City, and having lands, tenements, or personal estate of the value of* 100 *l.*"

You will distinguish persons competent, as the grand from the petit jurors, by prefixing the letter *G.* in the second column, against the names.

It is particularly requested that you will *distinguish partners by a circumflex*, and affix the number of each house opposite the juror's name.

The qualification of special jurors is, being described in your Return as "*esquire,*" *or persons of higher degree, or as* "*banker or merchant.*"

As it is desirable that the Return should be accurate, your attention is directed to the following exemptions from serving on juries, by the above statutes:—

"*To omit the names of all Peers, all Judges, all Clergymen, all Roman-catholic Priests who shall have duly taken and subscribed the oaths and declaration required by law; all ministers of any congregation of Protestant Dissenters whose place of meeting is duly registered, provided they follow no secular occupation except that of a schoolmaster, and produce to you a certificate of some Justice of the Peace of their having taken the oaths and subscribed the declaration required by law; all serjeants and barristers-at-law, all members of the society of doctors of law, and all advocates of the civil law, if actually practising, and all attorneys, solicitors, and proctors, if actually practising, and having taken out their annual certificates, and their managing clerks; all officers of the Courts of Law and Equity, and of the Admiralty and Ecclesiastical Courts, if actually exercising the duties of their respective offices; all coroners, all gaolers and keepers of houses of correction, and all subordinate officers of the same; all members and licentiates of the Royal College of Physicians in London; all members of the Royal Colleges of Surgeons in London, Edinburgh, and Dublin, and apothecaries certificated by the Court of Examiners of the Apothecaries Company, and all registered pharmaceutical chemists, if actually practising as physicians, surgeons, or apothecaries, or pharmaceutical chemists respectively; all officers of the navy and army on full pay; the master, wardens, and brethren of the Corporation of Trinity House of Deptford Strond, and their clerks, officers, and servants; all pilots licensed by the Trinity House of Deptford Strond, Kingston-upon-Hull, or Newcastle-upon-Tyne, and all masters of vessels in the buoy and light service employed by either of those Corporations, and all pilots licensed under any Act of Parliament or Charter for the regulation of pilots; all the household servants of Her Majesty; all Commissioners of Property and Income Tax; all officers of the Post Office; all officers of Customs and Excise; all sheriff's officers, high constables, and parish clerks; all officers of the rural and metropolitan police; and also all persons exempt by virtue of any Act of Parliament, prescription, charter, grant, or writ.*"

Persons under the age of 21 years and above 60 years are also exempt.

As the returns from the several wards are required to be bound into one book, it is proper that they should be made upon paper of uniform size; it is therefore expedient that you use foolscap of a size corresponding with this letter, and observe the annexed form.

I have, &c.
(signed) *Geo. W. K. Potter*,
Secondary.

N.B.—The Secondary is directed, in forwarding the above letter, to add the following extract of the Report of the General Purposes Committee, agreed to by the Court of Aldermen:—

"That the ward clerk should make out, or procure to be made out on his responsibility, a list of all persons liable to serve on juries within his ward, with a correct description of their residence, calling, and business.

"That for the purpose of enabling him to do so, he should be authorised and directed to require the ward beadle, or other competent person, yearly to go from house to house throughout the ward, to procure the necessary information.

"That such Return should include the names of all partners in any firm; it being the custom in several wards to return the name of one partner only in a firm, though this practice is manifestly illegal, the statute requiring that all persons

App. No. 3.

persons who are liable to serve should be returned. To lessen the inconvenience to parties as far as possible, it is the practice of the Secondary to summon only one of such partners to attend at the same time on any grand or petit jury.

"That the ward clerk should be careful to exclude from such list of jurors the names of all persons above the age of 60; likewise such as are suffering from permanent illness or incapacity; and also such as are disqualified or excused by reason of being aliens, or keeping a post-office, or for any of the causes mentioned in the statute 6 Geo. 4, c. 50, s. 2, and the 25 & 26 Vict. c. 107, s. 2 (set forth in the Secondary's Annual Letter to the Deputies).

"That the Aldermen, Deputy, and Common Council of the ward should go carefully through such list so to be submitted to them by the ward clerk, and revise the same, and state the qualification of each person, denoting whether a grand or petit juror; and properly describing such persons as they think should be placed on the list of special jurors, according to the statute.

"The list then to be signed, and transmitted to the Secondary."

Residence.	G. or P.	Names. (Partners Circumflexed)	Occupation.	Qualification.
No.				

REPORT

FROM THE

SELECT COMMITTEE

ON

SPECIAL AND COMMON JURIES;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

Ordered, by The House of Commons, *to be Printed,*
8 *July* 1867.

[*Price* 9*d.*]

425.

Under 8 *oz.*

REPORT

FROM THE

SELECT COMMITTEE

ON THE

WOODHOUSE COLLECTION;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

Ordered, by The House of Commons, *to be Printed,*
9 *August* 1867.

521.

Monday, 15*th July* 1867.

Ordered, THAT a Select Committee be appointed to consider and report on the Conduct of Mr. Consul General Saunders, with reference to the Bequest, by the late Mr. James Woodhouse, of his Coins and other Antiquities to the Trustees of the British Museum.

Thursday, 18*th July* 1867.

Select Committee nominated,—

Mr. Edward Egerton.
Mr. Cardwell.
Mr Howes.
Mr. Layard.
Mr. Beresford Hope.
Mr. Arthur Russell.
Mr. Lowe.

Ordered, THAT the Committee have power to send for Persons, Papers, and Records.

Ordered, THAT Five be the Quorum of the Committee.

Friday, 9*th August* 1867.

Ordered, THAT the Committee have power to report their Observations, together with the Minutes of Evidence taken before them, to The House.

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REPORT.

THE SELECT COMMITTEE appointed to consider and report on the Conduct of Mr. Consul General *Saunders*, with reference to the BEQUEST, by the late Mr. *James Woodhouse*, of his COINS and other ANTIQUITIES to the TRUSTEES of the BRITISH MUSEUM;——HAVE considered the Matters to them referred, and have agreed to the following REPORT:—

THE question referred to your Committee has arisen out of the following circumstances, viz.:

Mr. Woodhouse, who had formerly been in the Commissariat service, and was afterwards Treasurer of Corfu, had employed himself for many years in making a collection of coins and other antiquities, which he had expressed to several persons his intention of bequeathing to the British Museum, and concerning which Mr. Saunders, Her Majesty's Consul General in Corfu, had been for some time in communication with Mr. Newton, the Keeper of the Grecian and Roman Antiquities in the Museum. Mr. Woodhouse died in February 1866, leaving the following document, executed on his deathbed.

Question 6.

App. 10.
Questions 25. 630.

KNOW all men by these presents, that on the 24th day of February, in the year of our Lord 1866, I, the undersigned Frederick A. Cortazzi, Esq., British Vice Consul at Corfu, having been called upon by Mr. James Woodhouse, residing at Corfu, to attend at his place of residence, I found him in bed, perfectly in possession of his reason and faculties, but unable to write, and who, in the presence of the undersigned British Vice Consul and subscribing witnesses, declared as follows:

Correspondence, p. 1.

> "That as the trustees previously appointed by me are no longer residing at Corfu, and are consequently unable to act on my behalf, I hereby direct that this duty be discharged by Mr. James Taylor, of this place, and Mrs. Maria Costantini, *quondam* Antonio, who has been my companion during the last 50 years, well assured that these will faithfully discharge the duties confided to them in this respect; and I therefore revoke all other declarations and dispositions contrary to these presents. And, furthermore, I declare that, having been engaged in numismatic pursuits during a long residence in these islands, and being desirous that the collection of coins and other antiquities so formed should be dedicated to national purposes, I request Mr. Sidney Smith Saunders, Her Majesty's Consul General here, to take charge thereof, and, when recovered from the hands of my trustees, transmit the same to the British Museum on my behalf as a tribute to the national collection, while regretting that I am unable to accompany this donation with a suitable catalogue as I could have wished, for which a competent person should be appointed."

The testator having declared that these are the only things for which he desired to provide, I, the said Frederick Arthur Cortazzi, read over to the said James Woodhouse the foregoing dispositions word for word, who confirmed the same; in testimony whereof, being unable to subscribe his name thereto, from physical incapacity, he affixes herein-under the sign of the cross, declaring this as his own act and deed, in the presence of us, who at his request, in his presence, and the presence of each other, have hereunto subscribed our names as witnesses.

his
(signed) *James* + *Woodhouse*,
cross.

Witnesses:
(signed) *Napn. Zambelli*,
Advocate, Corfu.
George Shepheard,
Retired Assistant Commissary General, Corfu.
Charles Quinland,
Merchant, Corfu.

Before me, acting in my capacity as aforesaid,
(signed) *Frederick A. Cortazzi*, Vice Consul.

A true copy of the original deposited in this office, British Consulate General, Corfu, 26th February 1866.
(signed) *Sidney Smith Saunders*, Consul General.

Upon the death of Mr. Woodhouse, Mr. Saunders appears to have made that event known to the Foreign Secretary, to the Museum, and to the next of kin of the deceased. The following correspondence passed upon the subject:

Mr. *Saunders* to Mr. *Newton*.

Appendix to Correspondence, p. 193.

My dear Sir, Corfu, 26 February 1866.

Poor Mr. Woodhouse died this morning, and although he has not, I believe, left any other testamentary dispositions, I have secured the donation of his coins and other valuables for the National Collection by a document executed in the presence of competent witnesses only two days before his death.

I have written officially upon the subject to the Earl of Clarendon, who will doubtless transmit to the Museum authorities the authentic copy of the document aforesaid, which I have sent to the Foreign Office.

There is a strong box, which was prepared by the deceased to receive his donation, ready for the coins and other valuables, which I propose to embark in the first ship of war leaving this for Malta; but if you should think it desirable to come out yourself in order to determine what is worth selecting, or if you have any special directions to give me in the matter, pray furnish me with the requisite instructions for my guidance therein.

Believe me, &c.
C. T. Newton, Esq. (signed) *Sidney Smith Saunders.*

Mr. *Murray* to Mr. *Panizzi*.

Correspondence, p. 2.

Sir, Foreign Office, 6 March 1866.

I am directed by the Earl of Clarendon to transmit to you the accompanying copy of a Despatch from Her Majesty's Consul General at Corfu, reporting the death of Mr. James Woodhouse, formerly Treasurer General of the Ionian Islands, who has left a valuable collection of coins and antiquities to be made over by his trustees to the Consul General for the purpose of being transmitted to the British Museum, and I am to request that you will move the Trustees of the British Museum to cause Lord Clarendon to be informed what course they would wish to be taken with regard to this collection.

I am, &c.
A. Panizzi, Esq. (signed) *James Murray.*

Mr. *Saunders* to the Earl of *Clarendon*.

Correspondence, p 1.

My Lord, Corfu, 26 February 1866.

I have the honour to acquaint your Lordship that Mr. J. Woodhouse, formerly Treasurer General of the Ionian Islands, a pensioner under Schedule A. of the Convention of 29th March 1864, died here this morning, leaving an extensive series of coins, together with some valuable antiquities, which he has long since expressed an intention of presenting to the British Museum, considered by competent judges as an important addition to the national collection.

From various causes, however, his wishes in this respect having remained unfulfilled, he finally determined to execute a deed whereby his trustees were directed to make over these coins and antiquities to me, for the purpose of transmitting the same to the British Museum on his behalf.

In forwarding to your Lordship an authentic copy of this document for the information of the proper authorities, I would beg to be furnished with the necessary instructions for my guidance in this respect, and unless it should be deemed consistent for some qualified person to proceed hither for the purpose of making a suitable selection and catalogue, I would suggest that a strong box, already prepared by the deceased for the purpose of receiving the coins and other valuables, should be forwarded to its destination by the first ship of war proceeding from hence to Malta.

I have, &c.
The Earl of Clarendon. (signed) *S. S. Saunders*

Mr. *Newton* to Mr. *Layard*.

My dear Layard, British Museum, 6 March 1866.

Mr. Panizzi will be much obliged to you to send a telegram to Mr. Consul Saunders, at Corfu, instructing him to send home things as suggested by him in his Despatch of 26th February 1866. Correspondence, p. 4.

We are going to apply to the Admiralty to have a ship in readiness.

Yours, &c.
(signed) *C. T. Newton.*

Mr. *Murray* to Consul General *Saunders*.

(Telegraphic.) Foreign Office, 6 March 1866.

Send the things home in the manner suggested in your Despatch of 26th February.

Mr. *Panizzi* to the Earl of *Clarendon*.—(Received 8 March.)

My Lord, British Museum, 7 March 1866.

I have the honour to acknowledge the receipt of Mr. Murray's letter, under date 6th March, inclosing copy of a Despatch from Mr. Consul General Saunders, of Corfu, advising the donation by Mr. J. Woodhouse of his valuable collection of antiquities to the British Museum, and requesting instructions as to the mode of sending this collection to England. Correspondence, p. 3.

I have to submit to your Lordship the enclosed copy of a letter to Mr. Saunders, together with the original, and to beg that your Lordship will be so good as to direct that the latter may be forwarded to Mr. Saunders, through the Foreign Office, as soon as possible.

I have, &c.
(signed) *A. Panizzi.*

Sir, British Museum, 7 March 1866.

A copy of your Despatch, No. 15, under date 26th February 1866, to the Earl of Clarendon, and also your letter to Mr. Newton, of the same date, have been communicated to me; and I have to thank you, in behalf of the Trustees, for having so promptly acted in their interest. With reference to your inquiry as to whether you should at once send the strong box containing the coins and other valuables on board a ship of war, a telegram was sent to you yesterday from the Foreign Office instructing you to do this, as it is not thought expedient that any one should be sent from the Museum to make a catalogue of the collection before it is shipped; and I think it preferable that it should be sent *entire*, in accordance with the terms of the donation, rather than that any selection should be made. Correspondence, p. 3.

I have therefore to request that you will be good enough to pack the collection in a secure manner, and take the earliest opportunity of sending it on board one of Her Majesty's ships, consigning it to the special care of the captain.

The case should be addressed—

A. Panizzi, Esq.
Principal Librarian, British Museum.

Any expense that you may incur will of course be made good by the Trustees, who will no doubt instruct me to return to you their direct thanks for all the trouble you have taken, and may take, in this important matter.

I have, &c.
(signed) *A. Panizzi.*

Sidney Smith Saunders, C.M.G.,
H. B. M. Consul General, Corfu.

Mr. *Murray* to Consul General *Saunders*.

Sir, Foreign Office, 8 March 1866.

Correspondence, p. 4.

WITH reference to your Despatch of the 26th ultimo, I am directed by the Earl of Clarendon to transmit to you the accompanying letter from the British Museum, containing directions as to the transmission to this country of the Woodhouse Collection; and I am to instruct you to take the necessary steps to carry out the wishes of the Trustees.

I am, &c.
(signed) *James Murray.*

Mr. *Murray* to Mr. *Panizzi.*

Sir, Foreign Office, 10 April 1866.

Correspondence, p. 6.

WITH reference to your letter of the 6th and 7th ult., I am directed by the Earl of Clarendon to transmit to you the accompanying letter, addressed to you by Her Majesty's Consul General at Corfu, which has been received at this office under flying seal, reporting the steps he has taken with regard to the Woodhouse Collection of coins and antiquities.

I am, &c.
(signed) *James Murray.*

A. Panizzi, Esq., &c. &c. &c.
British Museum.

Consul General *Saunders* to the Earl of *Clarendon.*—(Received 9 April.)

My Lord, Corfu, 27 March 1866.

Correspondence, p. 4.

I HAD the honour to receive, on the 7th instant, the following telegraphic message:—

"Send the things home in the manner suggested in your Despatch of 26th February."

On the 12th I was informed by the senior naval officer on this station (as by the enclosed copy) that Her Majesty's ship "Enterprise" had been placed at my disposal for this purpose, and I therefore lost no time in making the necessary arrangements with the administrators of the deceased for the delivery of the coins and antiquities as contemplated, and for the preparation of an inventory thereof, which, being accomplished, the collection thus consigned to me was securely packed in eight boxes, under the seal of this Consulate, and subsequently enclosed in a large chest prepared by the deceased for this purpose, together with a sealed packet containing the several keys, also deposited within the said chest; the whole addressed to "The Trustees of the British Museum, Great Russell-street, London."

This chest having been duly delivered on board to the care of the captain, together with a handsome marble capital, set apart, the "Enterprise" left this on the morning of the 20th instant on her return to Malta.

I have subsequently received, *viâ* Athens, Mr. Murray's Despatch of the 8th March, forwarding a letter from the British Museum upon the subject, to which I now reply by the inclosed, under flying seal, sending the detailed inventory, in original, as received from the administrators; the total number of coins transmitted being as follows:—

Gold - - - - - - - - - -	85
Silver - - - - - - - - - -	2,380
Copper - - - - - - - - - -	3,069
Electrum - - - - - - - - -	11
TOTAL - - -	5,545

And a series of gold ornaments and other articles, according to list.

I have further to submit to your Lordship copies of correspondence with the next of kin upon the subject of this donation, showing that the parties have renounced all intention of contesting the validity of this bequest, as previously contemplated.

I have, &c.
(signed) *Sidney Smith Saunders.*

Mr. *Saunders* to Mr. *Panizzi.*

British Consulate General, Corfu,
27 March 1866.

Sir,

Appendix to Correspondence, p. 196.

YOUR letter of the 7th March having been mis-sent to Athens, only reached me this morning; but, in accordance with the instructions already communicated to me by telegraph, I have now to acquaint you that the Woodhouse Collection of coins and other valuables, as delivered over to me by the administrators of the deceased, was securely packed and consigned to the captain of H. M. S. "Enterprise," which left this for Malta on the 20th instant.

An inventory of the contents of the several sealed boxes, eight in number, is annexed, the whole being deposited in one large chest, together with the keys in a sealed packet, and addressed to the Trustees of the British Museum.

Among the coins so transmitted are comprised the contents of several loose packets found about the premises, which have been added to the general collection in the respective compartments, although many of these are understood to be of doubtful character, and, as such, set apart by the deceased. The transmission of these coincides with the wishes expressed in your letter that the collection should be *sent entire*, while explaining the circumstances which have led to the addition of such doubtful or rejected specimens.

The total number thus comprised in this collection have been counted and marked, tray by tray, as consisting of—

Gold - - - - - - - - -	85
Silver - - - - - - - - -	2,380
Copper - - - - - - - -	3,066 3
Electrum - - - - - - - -	11
	5,545

The expenses incurred in the packing and porterage have amounted in all to 4 *l.* 5 *s.*, as by the annexed account, which can be paid to my agents in the Foreign Office, Messrs. Alston and Bidwell.

I have at the same time to mention that the heirs of the deceased, now here, have recognised this donation in document, whereof copy has been transmitted to Her Majesty's Secretary of State for Foreign Affairs, while, however, requesting that they may be allowed the cession of such duplicates as may not be required for the use of the Museum.

I have, &c.
(signed) *Sidney Smith Saunders.*

A. Panizzi, Esq., Principal Librarian,
British Museum.

List of Articles from the Collection of the late Mr. *James Woodhouse*, handed over to S. S. Saunders, Esq., Her Britannic Majesty's Consul General, by the Undersigned Mr. James W. Taylor and Signora Maria Costantini, Trustees, in accordance with the Instructions of the aforesaid, contained in the Declaration made under date of 24th day of February 1866.

Contents of Case No. 1 (late Mr. Woodhouse's Coins):—

No. 1 Tray, 56 copper coins.
„ „ 4 silver „
„ 2 „ 54 „ „
„ 3 „ 56 „ „
„ „ 3 copper „
„ 4 „ 119 silver „
„ „ 21 copper „
„ 5 „ 129 silver „
„ „ 32 copper and lead coins.
„ „ 7 gold coins.
„ 6 „ 113 silver coins.
„ „ 3 copper „
„ „ 13 gold „
„ 7 „ 75 silver „
„ „ 58 gold „
„ „ 11 electrum „
„ „ 9 copper „
„ 8 „ in two parts—
„ „ A, 25 silver coins.
„ „ 63 copper „
„ „ B, 78 silver „
„ „ 17 copper „

Contents of Case No. 1—*continued.*

No. 9 Tray, in three parts—
„ „ A, 34 silver coins
„ „ 5 copper „
„ „ B, 56 silver „
„ „ C, 24 „ „
„ „ 2 copper „

No. 10 Tray, in three parts—
„ „ A, 29 silver coins.
„ „ 6 gold „
„ „ 28 copper „
„ „ B, 34 silver „
„ „ 3 copper „
„ „ C, 26 silver „
„ „ 1 copper „

Total contents of No. 1 Case—

Copper coins - -	243
Gold „ - -	84
Silver „ - -	856
Electrum „ - -	11
Coins - -	1,194

Contents of Case No. 2 (Coins):—

No.	1	Tray,	12	copper and	11 silver.
„	2	„	17	„	
„	3	„	18	„	
„	4	„	13	„	6 „
„	5	„	33	„	
„	6	„	8	„	20 „
„	7	„	–	„	36 „
„	8	„	–	„	29 „
„	9	„	25	„	19 „
„	10	„	18	„	27 „
„	11	„	20	„	27 „
„	12	„	21	„	29 „
„	13	„	15	„	17 „
„	14	„	28	„	
„	15	„	44	„	

Copper - 272 Silver - 221

Contents of Case No. 3 (Small Case):—

No.	1	Tray,	10	copper,	7 silver coins.
„	2	„	14	„	
„	3	„	13	„	3 „
„	4	„	13	„	18 „
„	5	„	22	„	5 „
„	6	„	16	„	4 „
„	7	„	23	„	16 „
„	8	„	25	„	10 „
Bottom of Box			8		

Copper - 144 Silver 63

No. 4 Cabinet:

No.	1	Tray, with	65	copper	coins.
„	2	„	60	„	„
„	3	„	72	„	„
„	4	„	60	„	„
„	5	„	50	„	„
„	6	„	70	„	„
„	7	„	51	„	„
„	8	„	65	silver	„
„	9	„	54	copper	„
„	10	„	60	„	„
„	11	„	51	silver	„
„	12	„	48	copper	„
„	13	„	61	„	„
„	14	„	74	silver	„
„	15	„	41	„	„
„	16	„	55	„	„
„	17	„	63	„	„
„	18	„	63	copper	coins.
„	19	„	57	silver	„
„	20	„	68	„	„
„	21	„	54	copper	„
„	22	„	29	„	„
„	23	„	57	„	„
„	24	„	60	„	„

Totol - - 1,388

Copper, 914; Silver, 474.

No. 5, Small Case:

No.	1	Tray	(lower tier)	28	copper	coins.
„	2	„	„	28	„	„
„	3	„	„	28	„	„
„	4	„	„	28	„	„
„	56	„	„	28	„	„
„	60	„	„	45	„	„
No.	5	Tray	(Top)	28	copper	coins.
„	6	„	„	18	„	„
„	7	„	„	28	„	„
„	8	„	„	28	„	„
„	9	„	„	19	„	„
„	10	„	„	18	„	„
„	11	„	„	28	„	„
„	12	„	„	36	silver	„
„	13	„	„	31	„	„

3 Trays empty.

Total - - - 419

Silver, 67; Copper, 352.

No. 6, Japanned Tin Case:

A.—No.	14	Tray,	36	silver	coins.
„	15	„	36	„	„
„	16	„	36	„	„
„	17	„	36	„	„
„	18	„	60	copper	„
„	19	„	39	„	„
„	20	„	38	„	„
„	21	„	49	„	„
„	22	„	38	silver	„
„	23	„	26	„	„
„	24	„	45	„	„
„	25	„	37	„	„
„	26	„	52	copper	„
„	27	„	50	„	„
„	28	„	51	„	„
„	29	„	41	„	„
„	30	„	32	„	„
„	31	„	52	„	„
„	32	„	49	„	„
„	33	„	21	silver	„
„	34	„	47	„	„
„	35	„	50	„	„
„	36	„	68	copper	„

Total - - 989

Silver, 408; Copper, 581.

B.—No.	37	Tray,	54	silver	coins.
„	38	„	41	„	„
„	39	„	38	„	„
„	40	„	38	„	„
„	41	„	21	„	„
„	42	„	21	„	„
„	43	„	37	copper	„
„	44	„	59	silver	„
„	45	„	21	copper	„
„	46	„	31	„	„
„	47	„	36	„	„
„	48	„	36	„	„
„	49	„	36	„	„
„	50	„	34	„	„
„	51	„	53	„	„
„	52	„	39	„	„
„	53	„	31	„	„
„	54	„	50	„	„

B.—No.	55	Tray,	30	copper	coins.
„	57	„	20	„	„
„	58	„	19	„	„
„	59	„	36	„	„
„	61	„	1	gold	„
„	„	„	19	silver	„
„	„	„	15	copper	„
„	62	„	36	„	„

Total - - 852

Gold, 1; Silver, 291; Copper, 560.

No. 7.

A. Gold collar, with three gem pendants, said to be found in a tomb at Ithaca.

B. Small card box, containing golden ornaments from the tomb of St. Elena, Corfu.

C. 9 pair gold ear-rings.
1 " " with ring.
23 gold rings.
1 small golden chain, with pendant.
1 ring, with two pendants.
6 golden plates.
1 garnet pendant.
1 breast pin, with urn pendant.

D. Ancient gem.

E. Silver snake.

F. Marble heart.

G. Pottery—Toad lamp, and three lead impressions.

1 seal of Zante, 3 meteoric stones.

H. Tin box, containing ancient weights.

I. " " two glass bottles.

K. Round leather box, containing one blue and enamelled glass bowl, and bottle.

L. Round leather box, glass bowl, and round bottle.

No. 7—*continued.*

M. Round red card box, containing variegated glass plate.

N. Terra-cotta mask.

(signed) *James W. Taylor,*
Trustee.

SUPPLEMENTARY TO TIN CASE No. 6.

10 leaden weights.
1 large bronze medal.
1 " " of Alexander.
1 " " of Corfu.

Box No. 8.

Marble head in profile.

Number of Case.	Gold.	Silver.	Copper.	Electrum.	Bronze.	TOTAL.
1	84	856	243	11	-	1,194
2	-	221	272	-	-	493
3	-	63	144	-	-	207
4	-	474	914	-	-	1,388
5	-	67	352	-	-	419
6 A	-	408	581	-	3	1,844
B	1	291	560			
-	85	2,380	3,066	11	3	5,545

(signed) *James W. Taylor,* Trustee.
Maria Woodhouse.

The "Enterprise" was accordingly sent to Corfu, and on 19th March the chest was shipped on board, and in due course arrived at the Museum. Upon its arrival, the following letter was addressed to Mr. Saunders by the Principal Librarian of the Museum :—

Appendix to Correspondence, pp. 29. 35.

Sir, British Museum, 2 May 1866.

THE Trustees of the British Museum have had before them your letter of the 27th March, received through the Foreign Office, with which you transmitted an inventory of the collection of coins and other antiquities given to the Trustees by the late Mr. Woodhouse, and informed them of the steps which you had taken for the conveyance of this valuable present to the Museum.

Correspondence, p. 6.

I am directed by the Trustees to express to you their especial thanks for the zealous and successful exertions which you have made to give effect to the intentions of the donor, and for the careful manner in which you have superintended the packing and transmission of Mr. Woodhouse's donation. I am happy to acquaint you that the coins and antiquities have reached the Museum this day in perfect safety.

The keys of the boxes have been delivered to me with your letter of the 19th March, addressed to the Trustees, and the collection is now under examination, with a view to a report being made thereon to the Trustees at their next meeting; after which I shall have the honour of addressing you again.

The sum of 4 *l.* 5 *s.*, which was expended by you on account of the Trustees, has been paid to Mr. Alston, of the Foreign Office, as you requested.

I have, &c.
(signed) *A. Panizzi.*

It soon, however, became evident from an examination of the contents of the chest, that it by no means contained the whole of the collection made by Mr. Woodhouse; and thereupon the Trustees communicated with the Foreign Office, and sent Mr. Newton to Corfu, to institute inquiries on the spot.

Appendix to Correspondence, pp. 36, 37.
Correspondence p. 20.

Two Papers have been printed for Parliament, the first entitled "Correspondence as to the Woodhouse Collection of Antiquities;" the second entitled "Appendix to the Correspondence," being a Report by Mr. Newton to the Trustees upon the subject, &c. &c. Both these Papers were referred to your Committee,

In answer to an Address of 30 May 1867.

Committee, and constitute a part of the material upon which their judgment has been formed. They have also examined orally Mr. Newton, Messrs. Woodhouse and Puddick, the next of kin of the deceased, Mr. Saunders and Mr. Murray.

Questions 135, 136, 137. 329.

Much remains in obscurity, since questions have been raised as to the precise intentions of Mr. Woodhouse, and the exact contents of his collection at the time of his death are unknown, and by consequence it is doubtful how far the articles which have found their way into the possession of the Museum, and of the next of kin, taken together, fall short of constituting the whole of that collection.

The following facts, however, seem to be free from doubt.

Correspondence, p. 41.
Question 706.
Question 789.
Questions 687. 689. 691.
Appendix to Correspondence, 1, p. 167.
Questions 647. 683. 684.
Appendix to Correspondence, pp. 131–134, also pp. 26, 27.

It appears that Mr. Consul General Saunders, aware that Mr. Woodhouse was about to die, obtained his signature to the document above quoted; that being suspicious of the persons about Mr. Woodhouse, and among them of the Signora Maria Costantini, who had been for more than 50 years his companion, and was named one of his trustees, he concurred with Mr. Taylor, the other trustee, in placing two policemen at the door, while Mr. Woodhouse still continued to live; that on Mr. Woodhouse's decease he placed the rooms which contained the collection under consular seal, and carried the keys to the consulate; that he went over the premises in company with Mr. Taylor, and with his chancelier, Mr. Arcadino; that he made search ineffectually for a supposed will; and that he made no inventory of the articles. The articles supposed to be intended for the Museum were selected by Mr. Taylor and Mr. Saunders, with the assistance of a German clergyman, Mr. Reichardt, who had been on friendly terms with Mr. Woodhouse, and whom, according to Mr. Saunders, he and Mr. Taylor regarded as an expert, competent to determine what articles were suitable for the Museum, and what were not.

Question 369.

Shortly after the departure of the "Enterprise," Mr. James Woodhouse and Mr. Puddick arrived in Corfu. What they found on their arrival has been thus described by Mr. James Woodhouse: — "The "premises looked as if an enemy had been sacking the town; papers "were left all over the rooms, books, manuscripts, silver dishes, on chairs "or tables; a cabinet was on the floor, and everything was broken open. The "keys belonging to most of them were on the table with labels to them, and in "many instances duplicates. The cabinets had been broken open; boxes, tea "caddies, tea-chests and everything. In the case of the cabinet it was forced "open. I have the key now, and use the key to it. The key was there at the "time when we arrived, I think it was in the door."

Question 779.
Questions 164, 165.

Mr. Saunders did not communicate at once either to the Trustees, or to the next of kin, the fact that a selection had been made, and that articles claimed by each had been given over to the other, and it remained for the Trustees in London to make this discovery for themselves. As regards the next of kin, after their arrival in Corfu, they appear to have heard it first from general report, and Mr. Puddick says,—

> "617. Did Mr. Saunders ever inform you that he had ever given any antiquities to the British Museum besides the coins?—Yes.
>
> "618. When did he tell you so?—On one of the visits, I do not know which; he told us on one of the visits, that he had sent some antiquities, and he explained why he did so; and that they had introduced the word antiquities themselves at the consulate, to cover the Ithaca necklace, and some other few things."

Questions 865. 905.

By the convention with Greece, of 4 October 1837, it is provided that "if "any British subject shall die in the territories of the King of Greece, or any "Greek subject, &c. . . . . the respective Consuls or Vice Consuls shall "exercise the right of administering to the property of subjects of their nation "so dying intestate, for the benefit of the legitimate heirs to such property, and "of the creditors upon the estate, so far as the laws of the respective countries "shall admit."

The question to be first determined is, In what capacity Mr. Saunders was bound to act in regard to the effects of the deceased; whether as administrator under the convention, or in any capacity arising under the document above set forth?

Question 905. At the close of the inquiry Mr. Saunders made a statement to your Committee which will be found in the evidence, and in which he says: "Perhaps I may be allowed to make some observations on what has passed this morning with reference to the duty of a consul in regard to property not covered by a bequest. I apprehend that it is to be considered that trustees acting under a will (if this bequest is to be considered as such) are seised with the whole of the property of the deceased, mentioned or not mentioned therein; that what is not specifically defined naturally appertains to the heirs-at-law, but that the trustees as executors of the will are seised with the whole of the property; I am advised that that is the view taken by legal gentlemen. That was the view I took of it originally, and I have been informed that it was the correct one. I should submit that it is more a question for high legal advice than for any officer of the Foreign Office, however competent he may be, to be able to pronounce upon such a matter. I do not understand that Mr. Murray does pronounce upon the subject; but I simply submit that it is a question for high legal advice; I would beg to make a supplementary statement, which I have put in writing, with reference to the application of the local law in Corfu, in cases of intestacy which would come into operation in the event of this bequest being treated as a case of intestacy. 'Before the proceedings connected with this inquiry are closed, I would beg to be allowed to offer a few remarks on the application of the Convention between Great Britain and Greece of 4th October 1837, in order to show what would have occurred had the case been treated *in limine* as one of intestacy. The 13th Article of that Convention provides as follows:—It shall be free for the subjects of Her Britannic Majesty residing in the dominions of the King of Greece, and for the subjects of his Majesty the King of Greece residing in the dominions of Her Britannic Majesty, to dispose of their property of every description, by will or testament, as they may judge fit; and if any British subject shall die in the territories of the King of Greece, or any Greek subject shall die in the territories of the Queen of Great Britain, without will or testament, the respective consuls or vice consuls shall exercise the right of administering to the property of subjects of their nation so dying intestate, for the benefit of the legitimate heirs to such property, and of the creditors upon the estate, so far as the laws of the respective countries shall admit. The French version of the text is perhaps even more precise in reference to such cases. It provides that, "Si un sujet Anglais venait à mourir dans les états du Roi de la Grèce, ou si un sujet Grec venait à mourir dans les états de la Reine de la Grande Bretagne, sans acte de derniere volonté ou sans testament, les consuls ou les vice consuls respectifs auront le droit d'administrer, aut profit des héritiers légitimes et des créanciers, autant qu'il sera permis par les lois des pays respectifs, la propriété des sujets de leur nation qui mouraient sans testament." It will thus be seen, that while the right of administering to the property in such cases is conceded to the consular authority, such administration must necessarily be subject to the forms of procedure required by the *lex loci*. Consequently the preparation of an inventory under such circumstances must have been carried out with all the formalities required by that law. The intervention of the local tribunals must therefore have been invoked to this effect, a proceeding manifestly prejudicial to the interests of all parties concerned. What, indeed, would have been said by those who had determined to leave this matter in my hands (*Appendix*, p. 34), as 'knowing best how to overcome any local opposition,' and under the conviction (*Ibid.*, p. 35), 'that should any local difficulty arise as to the exportation,' I should 'be able to arrange it far better than any stranger sent from England to Corfu to represent the interests of the Museum.' Yet the first step to be taken in this affair, under such circumstances, would have been a fatal move in the wrong direction, by throwing the matter into the hands of the local authorities, as the only course calculated to satisfy the requirements and responsibilities so devolving upon me in accordance with the law of the domicile. I need hardly dilate upon the nature of the formalities to be thus complied with; they are set forth in Article 913 of the Code Napoléon (Procédure Civile), upon which the Ionian law then and now in force in such matters (for this has not been abrogated) is founded; suffice it to say that the character of such proceedings, and of the judicial acts in connection therewith, would have been least in accordance with the desire entertained (*Appendix*, p. 35), that 'action should be taken with the utmost promptitude, and at the same time with as little publicity as possible.' The case, therefore, was necessarily treated *ab initio* as that of a British subject disposing of his property *par acte derniere volonte*, with trustees nominated to this effect. Dr. Zambelli had considered the instrument which he was instructed to prepare as such in designating it a codicil in the first instance (*Corr.*, p. 41), and its dispositions were characterised in communicating with the heirs, as a basis for letters of administration being granted to the next of kin (*Ibid.*, p. 77). On the other hand, it will be seen by reference to the depositions of one of the servants of the household (*App.*, p. 79), that the local authorities were quite prepared to step in had the opportunity been afforded them, the Procureur du Roi (or Avvocato Fiscale, as there adverted to) having come in person in the first instance to make inquiries in this respect. Such, therefore, was the view taken of the bequest, and the course pursued in unison therewith up to the time of the arrival of the heirs, whose intentions to recognise or dispute the same remained to be determined in the sequel. Having elected to respect the intentions so expressed, as set forth in their Petition to this effect (*Corr.*, p. 5), they were thereupon, after the necessary verification of their titles under affidavit, recognised and admitted as administrators to the estate in lieu of the trustees themselves, with special reserve as to the articles already disposed of by the latter, in accordance with the instrument which the heirs had recognised, and with a protective clause on behalf of the wife as regards her portion of the proceeds, to be paid to such person or persons as she might appoint to receive the same. Thus the consulate never took upon itself to administer to the property in accordance with treaty rights, as involving the application of the local law in matters prejudicial to the interests of all parties concerned; and I do not know how those interests could have been better provided for in accordance with the intentions of the deceased, and the determination of the heirs-at-law to respect those intentions as expressed in the instrument."

Questions 687. 792. 905.

The testamentary document itself was understood by Dr. Zambelli, when he delivered it to Mr. Saunders, to be a codicil to a former will, and search was made ineffectually by Mr. Saunders and Mr. Taylor for that will; failing its discovery, it seems to your Committee to have been at the least a question for legal consideration and advice, whether Mr. Woodhouse was not intestate as to all his effects, except those (whatever they might be) which in that document were bequeathed to the British Museum. It appears that at the time of the search for the will, and the failure of its discovery, Mr. Saunders was in actual possession of the premises and of all the property they contained. He says that he was so, on the requisition of Mr. Taylor, the managing Trustee, and acting only in aid of the Trustees and in subordination to them. But it appears to your Committee that if there was any uncertainty which articles constituted the portion covered by the document, or any doubt as to the law of Corfu in its bearing on the case, he was bound to await the decision of a tribunal, or at the least to arm himself with the best legal opinion he could obtain, before he parted with the control over any portion of the property.

Questions 687. 692.

Questions 634. 762. 771.

Question, 799.

While he continued in possession, he would be clearly bound to act impartially for those, whoever they might be, whom the law of Corfu should point out as entitled to the several portions of the property, and would not be justified in showing any favour to the Museum as against the next of kin, or to the next of kin as against the Museum.

Questions 750. 775.

Mr. Saunders, however, states that he did not consider himself entitled to act as administrator under the convention, and that he regards himself as having acted as consignee for the Museum. Regarding his conduct from this point of view, your Committee consider that he was bound to take every means lawfully within his reach, to guard the interests of the Museum in respect of the property of which he was consignee. He says indeed that he did not, and does not, know what "other antiquities" were intended by the testator to be conveyed by the bequest; but that he himself suggested the words in order to cover a certain necklace, and some other antiquities which he believed to be intended by Mr. Woodhouse for the Museum. It is to be regretted that as he took part in preparing the document he should not have taken care to have

Questions 734. 784. 803, &c.

Appendix 166.

have a clear understanding of its meaning; but since the words, "the collection of coins and other antiquities," are sufficiently comprehensive, unless qualified by the context or otherwise, to convey to the Museum the whole collection, it appears to your Committee that nothing but a legal decision would justify Mr. Saunders in surrendering his claim, as acting for the Museum, to any portion of it.

There was certainly nothing on the face of the document or elsewhere which would justify him in assuming with Mr. Taylor and with the aid of Mr. Reichardt the responsibility of determining what was intended for the Museum, and what was intended for the next of kin; and as an officer of many years' experience, he ought to have known that it was wrong to deprive either party of what was his, to give it to the other; or, if the right to any class of articles was doubtful, to anticipate the decision of a competent tribunal. This obligation was the more incumbent upon him, since the next of kin were known to be on their way to Corfu, and the telegraph would have enabled him to obtain instructions from the Foreign Office, or from the Museum, without delay.

In the testamentary document, the testator expresses his "regret that he was unable to accompany the donation with a suitable catalogue, and for which a competent person should be appointed;" Mr. Newton states, on the authority of Dr. Zambelli, who drew the testamentary document, and of Dr. Luzi, the legal adviser of Maria Constantini, the trustee, that those gentlemen suggested to Mr. Saunders the propriety of making an inventory of the whole collection. Mr. Saunders does not admit this statement, and gives in his oral evidence, in his concluding statement, and in his letter to the Secretary of State, the reasons which prevented his making the inventory. It appears to your Committee that the premises ought to have remained inviolate under consular seal until all the persons interested in the division of the property were properly represented on the spot, and that there is no justification for the dispersion of any portion of the property before their arrival, and in the absence of a complete inventory.

Correspondence, p. 1.

Appendix 27. 67. 138. 164.

Questions 630. 665. 905. Correspondence, pp. 44, 45. 76.

This observation would have been applicable in any case, but it is so more especially in the case of a collection of antiquities, comprising many articles in gold, and particularly where, as in the present instance, the Consul entertained very grave suspicions of the integrity of one of the Trustees, and of some of the servants who had surrounded the deceased.

Upon the whole, the result has been that a valuable collection of antiquities has been dispersed; that no sufficient means remain for ascertaining what portion of the articles has not reached the persons entitled to them; and that a clear violation of right has taken place in the division of the property by persons who had no authority to divide it.

Mr. Saunders, who is an officer of 40 years' experience, and possesses very high testimonials, which were laid before your Committee by Mr. Murray, the Assistant Under Secretary of State, having the superintendence of the Consular Department in the Foreign Office, does not appear to be conscious of any failure on his part in the course of these proceedings; on the contrary, he closes his statement in the following words, viz.: "I conceive that these additional explanations will fully serve to satisfy the Committee and the Trustees of the British Museum as therein represented, that my action in this matter has been irreproachable from first to last; and I cannot but feel confident that a just appreciation of all the circumstances will not only serve to exonerate me from any kind of imputation in this respect, but that the conscious conviction will have been established, and reign paramount in the minds of those to whom this inquiry has been entrusted, that ample reparation is due to me on this occasion for the unenviable requital hitherto experienced."

Question 904.

Questions 672. 905.

Your Committee have pointed out several serious breaches of duty on the part of Mr. Saunders; but they think it right to conclude their report by expressing their concurrence in the judgment of the Secretary of State, that there is nothing apparent in his proceedings which could be construed as an imputation that, in acting as he has done, he has been influenced by improper motives.

Letter of Mr. Murray to Mr. Saunders, Correspondence, p. 71.

PROCEEDINGS OF THE COMMITTEE.

Friday, 19*th July* 1867.

MEMBERS PRESENT:

Mr. Lowe.
Mr. Edward Egerton.
Mr. Howes.
Mr. Layard.
Mr. Arthur Russell.

Motion made, and Question, "That Mr. Cardwell do take the Chair."—(Mr. *Lowe*)—put, and *agreed to.*

Mr. Lowe (in the absence of the Chairman) was called to the Chair.

The Committee deliberated.

[Adjourned till Friday next, at Twelve o'clock.

Friday, 26*th July* 1867.

MEMBERS PRESENT:

Mr. CARDWELL in the Chair.

Mr. Lowe.
Mr. E. Egerton.
Mr. Beresford Hope.
Mr. Layard.
Mr. Arthur Russell.
Mr. Howes.

In the absence of Mr. Cardwell, Mr. BERESFORD HOPE was called to the Chair.

Mr. *Charles T. Newton* examined.

[Adjourned till Tuesday next, at Twelve o'clock.

Tuesday, 30*th July* 1867.

MEMBERS PRESENT:

Mr. CARDWELL in the Chair.

Mr. Lowe.
Mr. Beresford Hope.
Mr. Layard.
Mr. Arthur Russell.
Mr. Howes.
Mr. Edward Egerton.

Mr. *James Woodhouse* examined.

The Committee deliberated.

Mr. *James Woodhouse* further examined.

The Committee deliberated.

Mr. *James Woodhouse* further examined.

Mr. *John Edward Puddick* examined.

Mr. Consul General *Saunders* was examined.

Mr. *John Edward Puddick* further examined.

The Committee deliberated.

[Adjourned till Tuesday next, at Twelve o'clock.

Tuesday, 6th August 1867.

MEMBERS PRESENT:

Mr. CARDWELL in the Chair.

Mr. Lowe.	Mr. Arthur Russell.
Mr. Edward Egerton.	Mr. Howes.
Mr. Layard.	Mr. Beresford Hope.

Mr. *James Murray* examined.

Mr. Consul General *Saunders* further examined.

The Committee deliberated.

Adjourned till Friday next, at Eleven o'clock.

Friday, 9th August 1867.

MEMBERS PRESENT:

Mr. CARDWELL in the Chair.

Mr. Lowe.	Mr. Howes.
Mr. Edward Egerton.	Mr. Arthur Russell.
Mr. Layard.	Mr. Beresford Hope.

Draft Report, proposed by the Chairman, read the first and second time, and *agreed to.*

Ordered, To Report, together with the Minutes of Evidence and Appendix.

EXPENSES OF WITNESS.

NAME OF WITNESS.	Profession or Condition.	From whence Summoned.	Number of Days Absent from Home, under Orders of Committee.	Expenses of Journey to London and Back.	Allowance during Absence from Home.	TOTAL Expenses Allowed to Witness.
				£. s. d.	£. s. d.	£. s. d.
Mr. Sidney Smith Saunders	Consul General - -	Corfu - -	12	Nil.	12 12 -	12 12 -

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MINUTES OF EVIDENCE.

Friday, 26th July 1867.

MEMBERS PRESENT:

Mr. Cardwell.
Mr. Edward Egerton.
Mr. Beresford Hope.
Mr. Layard.
Mr. Lowe.
Mr. Arthur Russell.
Mr. Howes.

THE RIGHT HONOURABLE EDWARD CARDWELL, IN THE CHAIR;
AFTERWARDS MR. BERESFORD HOPE.

CHARLES T. NEWTON, Esq., called in; and Examined.

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26 July 1867.

1. Mr. *Lowe.*] WHAT is your office in the British Museum?—I am Keeper of the Greek and Roman Antiquities.

2. You have also been in the Consular Service, I believe?—Yes, from 1852 to 1861.

3. In what capacity?—As Vice-Consul at Mitylene, Acting Consul at Rhodes, and Consul at Rome.

4. When did you first hear of Mr. Woodhouse's intention to bequeath his collection of antiquities to the British Museum?—Some time in the year 1863.

5. You visited Corfu in October 1863, I believe?—Yes; having heard that Mr. Woodhouse had expressed an intention to bequeath his collection to the British Museum, I took Corfu in my way to the Levant, in October 1863.

6. Did you see Mr. Woodhouse?—Yes, I saw Mr. Woodhouse, and was received by him very cordially; as I state in my Report, in the Appendix, his first words to me were, that he had great pleasure in informing me, that he intended to bequeath his museum to the British Museum.

7. What did he say he intended to bequeath?—He spoke generally of his coins and antiquities, and he proceeded to show me certain choice specimens of both.

8. Did he speak of coins only?—Certainly not; he spoke of antiquities also, and particularly of two inscribed bronze plates.

9. In your letter, at page 101, in the Appendix, you mention some objects which were shown you by Mr. Woodhouse; can you call to mind any others besides those?—No; there were several coins which I mentioned in a part of the letter, not printed there, and which have reached us; I cannot call to mind any other objects, because I took hardly any notice of them at the time, and immediately after the interview, I wrote that letter to Mr. Panizzi, at page 101 of the Appendix.

10. Did you see the two bronze tablets now in the hands of Mr. Taylor?—I saw one of them; one of those tablets was there, and another Mr. Woodhouse had at that time lent to a friend at Athens, with a view to its being published.

11. Are those tablets objects of great value?—They are objects of very great interest.

12. What value do you put upon them?—It would be difficult to say; I should be prepared certainly to give 100 *l.* for them, which is a very high price for inscriptions; they are on bronze, which makes them very rare; they are published, and have a European reputation, and they are very curious specimens of dialect.

13. Mr. *Egerton.*] Of what date?—Very early; the number of bronze tablets in existence is very few.

14. Mr. *Lowe.*] Did Mr. Woodhouse say what he meant to do with those tablets?—He said of them, and of all the objects which I mention in my letter, that he intended to give them to the British Museum. I "state all these objects he told me several times he intends to bequeath to the British Museum." I recollect writing that immediately after the interview, to place it upon record.

15. Did he show you the whole of his museum?—No, certainly not: he showed me certain objects, which I think were all brought out in cases and placed on a table; there were many things which I have since learned formed a part of the museum, which I had no idea of, such, for instance, as a great collection of sepulchral marbles, of which he made no mention.

16. Did you at that time form any idea of the magnitude of the museum?—No, I had no evidence from that interview that could give me any idea of the magnitude of the museum, nor of the classes under which it could be arranged.

17. With regard to packing it, could you tell what kind of packages it would require?—Certainly

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tainly not; I could form no conclusion as to whether it could go in one strong box or two.

18. Did he show you the silver lamp described in the Appendix?—No.

19. In your letter to Mr. Panizzi, you speak of gold ornaments?—Yes, I remember the gold ornaments generally; they struck me as very good of their kind.

20. You cannot say anything as to the quantity of them?—No, I can only say that on seeing those which were sent to us by Mr. Saunders, I had a general impression that I had seen more.

21. Had you any further communication with Mr. Woodhouse after this interview?—In May 1865, I was coming back from the Levant again, and I called at Corfu; the steamer waited about two hours, during which interval I saw Mr. Woodhouse again, and he then repeated his assurance that he intended to leave his collection to the British Museum, and spoke of a portion as already packed, at least so I reported to the Trustees at the time. In my Report, dated 8th June 1865 (referred to at page 10 of the Appendix), I state that he received me most cordially, and assured me most positively "that a portion of his collection was already packed, and that it was his intention to take an early opportunity of sending it to England to be presented to the British Museum." That is my official report of the interview, made at the time; I made no other note of it.

22. Mr. *Layard.*] That report is now published in the Appendix?—No.

23. Mr. *Lowe.*] It can be produced, if wanted?—Yes.

24. Mr. Saunders was then consul?—Yes.

25. Did you say anything to him about it?—Yes; I had seen him in England soon after his appointment, before my second interview with Mr. Woodhouse, and I then recommended to him very strongly this probable bequest, and explained to him that it was very desirable that the things should be properly cared for, in case of Mr. Woodhouse's death, he being a very old man; and I called upon Mr. Saunders, either immediately before or immediately after my second visit to Mr. Woodhouse, and had an interview with him a few minutes, in which I repeated the recommendation.

26. Did you say anything to him about Mr. Woodhouse's nephews, or there being any necessity for speed?—No; I had no knowledge of any intentions on their part at that time; I knew the fact that he had a nephew, and that was all.

27. *Chairman.*] You have spoken of two interviews with Mr. Saunders; what was the date of the first?—That was when Mr. Saunders was in England, which I think was in the autumn of 1864.

28. Mr. *Beresford Hope.*] In 1863, Mr. Saunders was not Consul at Corfu?—When I was there in 1863, the annexation was taking place, and Sir Henry Storks was still Lord High Commissioner.

29. Mr. *Lowe.*] When did Mr. Saunders go to Corfu as Consul; was not it in 1864?—It was in 1864.

30. *Chairman.*] You referred to a second interview with Mr. Saunders; when was that?—The second interview with Mr. Saunders took place in May 1865; I think I called upon him immediately before seeing Mr. Woodhouse, and asked him whether I should find Mr. Woodhouse at home. I may have seen him again immediately after the interview; but I cannot speak positively, as I was only there while the steamer stopped.

31. Mr. *Lowe.*] What further communication had you with Mr. Woodhouse after this?—I then asked Mr. Woodhouse whether he would like a copy of a book I had recently published of Travels and Discoveries in the Levant, and he said "Yes." I accordingly sent him that book, and I received in reply a letter from him, which is printed in the Appendix, at page 135.

32. In that letter does he say anything about his intentions with regard to the Museum?—He says, "In confirmation of your remark on the Tub of Diogenes, in 1st vol. p. 184 of your work I have got a terra-cotta lamp, found here in a Greek tomb a few years ago, accompanied by a coin of Cassander, which may be considered to establish its age. This lamp I will take care shall be put up with my coins, &c., when sent to the British Museum; this I hope to be before Christmas."

33. Have we got that lamp?—No.

34. Had you any further communication with Mr. Saunders after your visit to Corfu, and before Mr. Woodhouse's death?—I am not aware of any further communication with Mr. Saunders.

35. We heard of Mr. Woodhouse's death, when?—On the 6th of March 1866.

36. The death took place on the 26th of February?—Yes.

37. What did you do upon receiving information of Mr. Woodhouse's death, after consulting with the Principal Librarian?—I received a private letter from Mr. Saunders, which is given at page 63 of the correspondence, and the same day Mr. Panizzi received a copy of a letter from Mr. Saunders to the Foreign Secretary, which is also given in the correspondence. Immediately upon receiving the news of the demise, I told Mr. Panizzi that I was ready to start for Corfu that night, but that it might be a question whether it was desirable that I should go, as it was possible that there might be difficulties raised by the Greek Government about the exportation. By Mr. Panizzi's direction I went to the Foreign Office, and had an interview with Mr. Layard, then Under Secretary of State, and I told Mr. Layard that Mr. Panizzi had sent me to him, and that I was quite prepared to start, but that Mr. Panizzi wished that I should take his opinion upon the expediency of it. Mr. Layard then said to me that he did not recommend anything of the kind; that he thought that Mr. Saunders was fully competent to manage the thing, and that it would be better that no person should be sent from the Museum; that it should be managed by our consul upon the spot.

38. What reason did Mr. Layard give for that recommendation?—Mr. Layard thought that the sending out of an envoy from England would draw attention to the bequest; that it would assume a greater consequence in the eyes of the local authority, and that it would be better to leave it to Mr. Saunders' management.

39. Why was it considered expedient to keep it from the eyes of the local authority?—As I state in my Report, it was thought that the local authorities might raise some difficulties with regard to the exportation, and therefore Mr. Layard considered it best to leave it to the management of Mr. Saunders instead of sending out an envoy

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from England, which would give the whole transaction an importance which it would not otherwise assume.

40. Was there at that time any law in Corfu to prevent the exportation of such things?—I have been since informed that the Greek law, forbidding the exportation of antiquities, was not then in force, and was not in force until the month of June of the same year, and I was not aware that the Ionian law would have prevented it; I do not speak positively upon that point.

41. Was anything said at all about expediting the sending away of the collection, in order to get it out of the hands of Mr. Woodhouse's nephews?—Certainly not; I knew nothing about the claims of the nephews then; and I conceive, so far as that, the whole thing was perfectly plain, because Mr. Saunders, writing to me (page 33, Appendix), said he had secured the donation of coins and antiquities by a document, &c., and he says, "unless you like to come out yourself, I propose to send it home by the first ship of war."

42. At what page is your interview with Mr. Layard referred to?—Page 34.

43. You went to the Admiralty for a ship of war to take the collection away?—Yes; I took a requisition from Mr. Panizzi for a ship of war, which was telegraphed for immediately, and which arrived at Corfu on the 10th of March.

44. Mr. *Layard.*] You state in your Report at page 34, that the advice I gave you was "quite in accordance with the recommendations made to you on several previous occasions by Sir H. Storks, Sir Drummond Wolff and Mr. Erskine, Her Majesty's minister at Athens;" is that the case?—Yes.

45. They recommended you to get the things away, as I had suggested?—I should explain that this advice was given on the contingency of Mr. Woodhouse dying at some future time. When I was first acquainted with Mr. Woodhouse's intentions in 1863, I said to Sir Henry Storks, "Suppose the English leave this place, and this man dies afterwards, and then the Greek law is in force, what will happen?" and again after the evacuation by the English, I pointed out the same difficulty to Mr. Erskine. I naturally consulted the persons best qualified to give me advice, and they thought it had better be managed in the kind of way you suggested.

46. Mr. *Lowe.*] Was Mr. Saunders informed by telegram that the ship was coming?—Not to my knowledge; it did not form part of the telegram which was sent.

47. In the Appendix, at page 35, you remark that "In the peculiar circumstances of the case, action should be taken with the utmost promptitude, and at the same time with as little publicity as possible." Why did you write that?—Because I consider that in all cases of exportation of antiquities from foreign countries, so far as my experience goes, and I have superintended the exportation of objects of great value from different countries, it is always desirable that the exportation should take place with the utmost promptitude, for the better security of the property, and with as little publicity as possible, whether the local Government have given permission or not. For instance, when I exported the Farnese statues from Rome (within the last three years), the Roman Government gave to the King of Naples the privilege of having them exported duty free; and therefore there was no opposition on the part of the Government; nevertheless, the Roman Government sent me an intimation that they should be better pleased if the removal of those statues from the palace took place at night, though it was at the time of year when there are fewest people in Rome, namely, in the month of August; they requested that it should take place at night, because they did not want public attention to be drawn to the fact that statues were going out of Rome.

48. What next passed between the British Museum and Mr. Saunders?—Mr. Panizzi, on the 7th of March, wrote to Mr. Saunders a letter, which he received on the 27th of March, and in which Mr. Panizzi directs him to send the collection home entire, and informs him that a ship of war had been sent.

49. Did you believe that the collection was sent entire when you received advice from Mr. Saunders of something being sent?—A letter was written by Mr. Saunders, dated March 19th, and which was sent with the articles shipped; and another letter was sent by Mr. Saunders, dated March 27th (page 196, Appendix), which inclosed the inventory, and which reached us on the 10th of April; in that letter he states that he has, in accordance with Mr. Panizzi's advice, sent the collection of coins entire: he says, "Among the coins so transmitted, are comprised the contents of several loose packets found about the premises, which have been added to the general collection in the respective compartments, although many of these are understood to be of doubtful character, and as such set apart by the deceased; the transmission of these coincides with the wishes expressed in your letter, that the collection should be sent *entire,* while explaining the circumstances which have led to the addition of such doubtful or rejected specimens."

50. Mr. *Layard.*] The word "entire" is in italics, is that so in the original; that is to say, was the word underlined?—I conclude so; I have no doubt it is copied accurately. [Mr. *Jones* referred to the original, in which the word "*entire*" was found to be underlined.] *Witness.* I was asked whether I supposed the whole collection had been sent; and I was proceeding to say that, before we received the objects themselves, we received this advice of their shipment; and, upon reading the inventory, I then remarked to Mr. Panizzi, that the two bronze plates which I had noted in my letter were not there, and also another object which I had noted in my letter as a bronze disk, with the figure of an athlete upon it.

51. I want to know whether the construction you put upon this letter at the time was that the whole collection was sent?—The construction I put upon the two letters advising the demise, I mean the two letters of Mr. Saunders of the 26th of February, was that Mr. Woodhouse had bequeathed to us his whole collection of coins and antiquities; there was no appearance of any reservation.

52. Was that the impression, as a matter of fact, entertained at the British Museum?—Certainly.

53. The collection was to be given over without any deduction?—Yes; I knew only from what Mr. Woodhouse had shown me of certain antiquities and certain coins; I was then told that he had bequeathed an extensive series of coins together with some valuable antiquities.

54. Mr. *Beresford Hope.*] I presume you thought that the word "&c." covered a great deal in his letter to you?—The word "&c." must be taken to include what it would cover; that letter was written previously to the demise.

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55. Mr. *Lowe.*] Looking at the letter of the Foreign Office, what appears to have been their construction of the matter?—In Mr. Murray's letter, which is given at page 196 of the Appendix, he speaks of Mr. Woodhouse's collection of coins and antiquities, and in Mr. Murray's first letter (page 193, Appendix), inclosing Mr. Saunders' official letter, advising the demise, he says: "Sir, I am directed by the Earl of Clarendon to transmit to you the accompanying copy of a despatch from Her Majesty's Consul General at Corfu reporting the death of Mr. James Woodhouse, formerly Treasurer General of the Ionian Islands, who has left a valuable collection of coins and antiquities to be made over by his trustees to the Consul General, for the purpose of being transmitted to the British Museum."

56. What does Mr. Saunders say himself in his letter to you; he says, "coins and other valuables," does not he?—At page 63 of the correspondence he says, "I have secured the donation of his coins and other valuables."

57. In the letter to Lord Clarendon, what is the expression that he uses?—In the letter to Lord Clarendon, at page 194 of the Appendix, he says that he leaves "an extensive series of coins, together with some valuable antiquities, which he has long since expressed an intention of presenting to the British Museum, considered by competent judges as an important addition to the national collection."

58. *Chairman.*] In the letter from Mr. Saunders to you at page 63 of the correspondence, he says, "there is a strong box"?—He says that in both letters.

59. Did you understand from that that all the coins and valuables might be contained in a single box?—It appeared so from his letter; I did not give it much thought at the time.

60. Mr. *Lowe.*] Had you enough knowledge at the British Museum to enable you to form an opinion upon that point?—I had no knowledge to enable me to do so.

61. You had never seen the collection as a whole?—Never; he was a man who liked to show things in a fixed order; everybody who has seen the collection will testify to that; he would take out certain things, and show them to people, and would not let them touch anything else.

62. How was the museum displayed in his rooms?—I have no remembrance of any display; I have a very confused recollection of the room shown me.

63. *Chairman.*] What I wanted to ask you, with reference to the letter at page 63 of the correspondence was mainly this, whether it is not a reasonable inference from that letter, that Mr. Saunders when he wrote it had in his mind such a collection only as could be contained in a single box?—Certainly.

64. Mr. *Lowe.*] When did you receive those things?—We received them on the 1st of May.

65. What other information came to your knowledge about that time, with reference to the Woodhouse collection?—With regard to the first of the two plates which I had missed, I thought, as Mr. Woodhouse in 1863 had told me that one of these plates was then at Athens, preparing for publication, that he might have lent them to the same learned friend there, and that the learned friend might have forgotten to return them. I therefore wrote to Mr. Merlin, our Vice-Consul at Athens, and asked him to inquire privately and ascertain whether the plates were there. In the meantime, Mr. Merlin happened to go to Corfu, and saw the plates in Mr. Taylor's shop, who, as Mr. Merlin understood him, wished to sell them. Mr. Merlin then said, "I think the British Museum ought to have the refusal of these plates." Mr. Taylor gave him to understand that he would not take less than a large sum for them. Mr. Merlin thinking they were objects of interest to the British Museum, immediately wrote off to me, that he had seen them in Mr. Taylor's hands, and that Mr. Taylor wished to sell them to him. Mr. Merlin's letter to me crossed my letter to him. I also, about the same time, that is in the course of the month of May, happened to be turning over the leaves of a German book, in which I saw the name of Mr. Woodhouse, and in which I found a description of a silver lamp, quoted from a very rare book on the antiquities of Corfu. I then learned for the first time that the silver lamp, and a very curious object it was, formed a portion of Mr. Woodhouse's collection; this led me to ask the only persons I could hear of, who had seen the collection, to come to the Museum and see what we had got; it struck me that the gold ornaments were fewer in number than I had seen. The only persons I could find at that time, who knew the collection at all, were Sir Drummond Wolff; Mr. De Fonblanque, who had been Commissary General at Corfu, and Lady Strangford, who had taken particular notice of the gold ornaments in her visit to Corfu in 1863. Sir Drummond Wolff and Mr. De Fonblanque came to the British Museum, and said at once, that the collection of gold ornaments they had seen in Mr. Woodhouse's hands was very much larger than what was sent. Lady Strangford was too ill to come, but she wrote a letter, which is given in the Appendix, stating various objects which she remembered. I then laid those facts before the Trustees in a Report, at the beginning of June. They met on the 4th of June, and they sent me out to Corfu to make further inquiries.

66. Where did you go to first?—I went first to Constantinople, and, secondly, to Athens. My object in going to Constantinople was, that I thought Baron Prokesch Von Osten, who has a great knowledge of antiquities, would be as likely as anybody to tell me what was in the Woodhouse collection, having been in the east many years. My object in going to Athens was, that I knew Mr. Lambro, a very intelligent dealer there, was as likely a person as anybody to tell me about what had been in the Woodhouse collection, and I thought I should hear some information about any articles that might have been abstracted, presuming that the antiquities, if they had been so abstracted, would have travelled eastward rather than westward.

67. What did you learn at either place?—At Constantinople I learned nothing. At Athens I met Mr. Valaoriti and Dr. Zambelli at the embassy.

68. Who were Mr. Valaoriti and Dr. Zambelli?—Mr. Valaoriti was the ex-minister for foreign affairs, a Corfiote gentleman. Dr. Zambelli is an advocate of Corfu, who had been very much trusted, and known to the British Government, and had been the legal adviser of the War Department at Corfu, and it was from those gentlemen that I learned for the first time, and to my great surprise, that a large number of antiquities had

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had been handed over by Mr. Saunders to the heirs at law.

69. Mr. *Egerton.*] Did you tell Mr. Saunders that Dr. Zambelli had stated that he had desired that an inventory should be made?—I cannot say whether I did or not.

70. Mr. *Lowe.*] Did you inform Mr. Panizzi what Dr. Zambelli had said about an inventory?—Yes.

71. What was it that he did say?—Dr. Zambelli told me that after the execution of the instrument which Mr. Woodhouse signed, he recommended to Mr. Saunders to have an inventory made, and Mr. Saunders declined.

72. Mr. *Layard.*] Was that before the death of Mr. Woodhouse?—I stated in a letter addressed to Mr. Panizzi from Athens that Dr. Zambelli had said that to Mr. Saunders immediately after the execution of the instrument.

73. *Chairman.*] And was it so?—At page 138 of the Appendix, I state that "immediately after Mr. Woodhouse's death, Dr. Zambelli suggested to Mr. Saunders the propriety of having an inventory made of the collections, but Mr. Saunders declined to do so."

74. Have you any reason to doubt that that note is accurate?—I have not the slightest reason to doubt it. I have a reason for believing it to be most accurate, because my draft of Dr. Zambelli's statement, which Mr. Saunders calls in question, was submitted to Dr. Zambelli himself by me. I have here the original draft, with the pencil alterations made by Dr. Zambelli, in his own handwriting.

75. Mr. *Lowe.*] Will you read it?—I will first read my draft, without any alterations:—"June 22nd, 1866.—Evidence of Signor Napolèone Zambelli, from notes of his conversation with me at Athens, on the above date.—Is an advocate at Corfu, who has been frequently consulted by the British authorities there, and is well known to Mr. Erskine, Mr. De Fonblanque, Sir H. Storks, and others. Was a friend of the late Mr. Woodhouse for many years at Corfu. Was requested by him, a short time before his death, to take charge of a packet of antiquities which he wished to bequeath to the British Museum, and which he stated to contain the most choice objects in his collection. Declined to receive any such trust, observing to Mr. Woodhouse that the British Consul, Mr. Saunders, was the proper person to receive such bequests on behalf of the British Government. Shortly before the death of Mr. Woodhouse, was called in to prepare his testamentary depositions; that, on being charged with this business, he was asked by a female about Mr. Woodhouse, what provision would be made for the Senora Maria; that on this matter being referred to Mr. Woodhouse, he told Zambelli that he had invested a sum of money in Ionian bonds on her account, but that fearing that this sum would not be sufficient, he had placed 900 *l.* in the hands of Mr. Taylor for her benefit, the interest of which was to be paid to her during her lifetime; that he then called on Mr. Taylor in the presence of Mr. Woodhouse to acknowledge that he so received this money in trust, and that Mr. Taylor did so acknowledge it in his presence; that from Mr. Woodhouse's dictation he drew the draft of a deed of gift (the document bearing date 24th February 1866, subsequently executed); that he submitted this draft to Mr. Saunders, at whose suggestion, and with the assent of Mr. Woodhouse, the words, 'and other antiquities,' were added in the donation; that Mr. Woodhouse was disposed to put off signing this deed, but that as his end was rapidly approaching, and Mr. Vice-Consul Cortazzi, whose presence would be necessary to witness the signature, was likely to leave Corfu, Signor Zambelli persuaded Mr. Woodhouse to execute the deed without delay; that at the time of making the signature, though too weak to sign his name, Mr. Woodhouse was perfectly sensible, and in the opinon of Mr. Zambelli no doubt could be entertained as to his legal competence to execute such a testamentary document. In proof of which competence it might be noted, that during the reading of the deed to him, after hearing the sentence which states that Signora Maria had been his companion for 50 years, he added that the period was even longer, which was the fact; that immediately after the demise Signor Zambelli suggested to Mr. Saunders the propriety of having an inventory taken of the antiquities in the house, but that Mr. Saunders declined to do so; that, in the opinion of Mr. Zambelli, the inventory sent to the Museum by Mr. Saunders was invalid, being neither attested nor drawn up in proper legal form, nor legalized by the Consul." That was my original draft. I took that to Dr. Zambelli, seeing the importance of having it accurate; and I must mention that this was taken down in the confusion of my first day's arrival at Athens, and I wished to have his deliberate statement. Dr. Zambelli said to me: "That is not exactly as I stated it to you; I will write upon the draft what I did say, and what I wish you to receive as my statement." Now I will read the text as Dr. Zambelli corrected it, which will be made up partly from my sentences in ink which he left untouched, and partly from his pencil alterations.

76. Mr. *Layard.*] Does what you have read correspond with your report as it stands in the Appendix?—I believe so, substantially; the alterations were merely unimportant alterations. I will now read the draft corrected by Dr. Zambelli: "June 22nd, 1866. Evidence of Signor Napolèone Zambelli, from notes of his conversation with me at Athens, on the above date. Is an advocate at Corfu, who has been frequently consulted by the British authorities there, and is well known to Mr. Erskine, Mr. De Fonblanque, Sir H. Storks, and others; was a friend of the late Mr. Woodhouse for many years at Corfu; Mr. Woodhouse sent for him two days before his death; he was lying in his bed, and very seriously ill. He told him that he was uneasy about his collection, which he destined to the British Museum."

77. Mr. *Beresford Hope.*] I see in the print the Italian word *collezione* is put in?—Yes; he used that word "which he destined to the British Museum. That with a wish to forward it to England more easily, he had already made a parcel" (this is all in Dr. Zambelli's own writing) "in which he had packed up a part of that collection, reserving to himself to pack up in the same way the remainder, when he felt better. That for the present he begged that Mr. Zambelli would receive the parcel already prepared, and take care that it should be sent to England. Mr. Zambelli having observed that the proper man to take care, for the British Museum, of such precious objects was the British Consul-General, and that at all events neither himself nor the Consul would

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would accept the trust without a document from the hand of Mr. Woodhouse showing the intentions of the donor and the contents of the parcel. Mr. Woodhouse according to Mr Zambelli's suggestion authorised Mr. Zambelli to draft a sketch of the deed" (I say the draft of a deed. Dr. Zambelli says, "to draft a sketch of the deed"), "and begged that in the document to be executed there should be introduced a clause purporting the substitution of Mr. J. W. Taylor and his Signora, Mrs. Maria Costantini, as trustees or executors, instead of those he had appointed previously (Mr. Boyd, I believe), and who had already left the country. Mr. Zambelli proceeded then to inform Mr. Saunders of what had happened, and both agreed to prepare the document which was to be submitted to Mr. Woodhouse. The substance of the document was dictated by Mr. Saunders, Mr. Zambelli having taken upon himself to give a legal form to it. This having been done, the document, after some modification from the Consul or Vice-Consul, with regard to formalities, was prepared and handed over to Mr. Zambelli, who immediately called on Mr. Woodhouse and read it to him word by word, slowly, so as to enable him to hear and declare whether the document expressed precisely what he meant. Mr. Woodhouse then declared that what he heard was perfectly what he intended to express, and this declaration he did repeat the day afterwards, when the document was solemnly executed and read to the donor by the Vice-Consul, in the presence of witnesses. After the execution of the deed Mr. Zambelli affirms that he has had no occasion either to be consulted or to meddle in the steps taken after Mr. Woodhouse's death, in order to secure either the effects of the donation or the interests of the heirs."

78. Mr. *Lowe.*] That is all in pencil, in the handwriting of Dr. Zambelli?—Yes; there the pencil ceases. Then Mr. Zambelli, after the words "executes the deed without delay," puts in, in pencil, "Mr. Zambelli added," (then the text goes on,) "that at the time of making the signature, though too weak to sign his name, Mr. Woodhouse was perfectly sensible; and, in the opinion of Mr. Zambelli, no doubt could be entertained as to his legal competence to execute such a testamentary document. In proof of which competence, it might be noted that during the reading of the deed to him, after hearing the sentence which states that Signora Maria had been his companion for 50 years, he added that the period was ("Mr. Zambelli has put in the figures 54.") I had said, "was even longer." Then the text goes on—"That immediately after the demise, Signor Zambelli suggested to Mr. Saunders the propriety of having an inventory taken of the antiquities in the house, but that Mr. Saunders declined to do so."

79. Mr. *Beresford Hope.*] Was the word "antiquities?"—It is "antiquities" here.

80. It is "collections" in the print?—There are some trifling alterations. Then my text proceeds without any alteration.

81. Mr. *Layard.*] Then Dr. Zambelli does not make any remark upon the statement that he had suggested to Mr. Saunders the propriety of having an inventory taken, and that Mr. Saunders declined to do so?—No; he makes no alteration in that part.

82. I understood you to say (in answer to a previous question), that Mr. Zambelli furnished proof of his having made that suggestion t Mr. Saunders, by having stated so in his ow handwriting in pencil?—No. I said I had submitted that draft to Dr. Zambelli, and that h had revised the draft, and that, though tha passage occurs in the draft, he has not touched i

83. He has made no observation upon you statement?—No, he has cut out a great deal.

84. Mr. *Egerton.*] Why did not you publis it exactly as it stood in the draft?—The alterations were only alterations made at the time; i sending it home to Mr. Panizzi, I made th thing a little more according to English at th time, and I did not think it necessary to prin it exactly as it had been written; the alteration did not seem to me to affect the statement; wha is printed is what I sent home to Mr. Panizzi.

85. Mr. *Beresford Hope.*] It is your ow memorandum, not signed by Dr. Zambelli?—I has not his signature.

86. *Chairman.*] Am I right in assuming tha the difference between the two papers is, tha that which is printed in the Appendix is you statement, while that which you have just rea is your statement after having been submitte to, and corrected by, Dr. Zambelli?—No; wha is printed in the Appendix is the statement a corrected by Dr. Zambelli; it is not literally th same, because several words are altered, but i is in substance the same.

87. Mr. *Layard.*] You prepared from memor a memorandum of the conversation between yo and Dr. Zambelli; then you submitted that memorandum to Dr. Zambelli, and he made certai alterations, and then you wrote out a fair copy o your memorandum, making such alterations a Dr. Zambelli had suggested, and you sent tha copy home, and that is the copy which is printe in the Appendix?—Yes.

88. *Chairman.*] But the document as printe as you have now explained, does not precisel follow in words the original document?—No; no word for word.

89. Mr. *Beresford Hope.*] You consider tha document to be a draft on which to prepare statement of facts?—I considered that documen to be a draft of Dr. Zambelli's statement to me as corrected by himself.

90. Mr. *Lowe.*] Can you point out any important divergence of any kind between you draft and Dr. Zambelli's pencil addition?—I thin not; perhaps Mr. Saunders might consider som of the variations important. I say "to prepar a draft;" he says "to prepare a sketch of a draft;" and instead of saying "some modifications of formal nature," Dr. Zambelli says "some modifications in the formalities."

91. Mr. *Beresford Hope.*] It seems to me, looking at the two, that one represents the othe exactly, except that, in the print, I see "Mr. Woodhouse listened attentively"; you may derive that from the context, but that statemen seems to be the only thing that goes beyond mere verbal discrepancy between the two?—I was not aware that there was that discrepancy.

92. Mr. *Layard.*] You say, in the print, "Mr. Saunders, *and* Mr. Cortazzi made some modifications;" in Dr. Zambelli's writing it is "Mr. Saunders, *or*"?—The word "or," in the pencil, is so exceedingly faint, that it might easily be mistaken for "and."

93. Mr. *Lowe.*] Can you point out any statements of Mr. Saunders which are at variance with this statement of Dr. Zambelli?—I remark

in the Appendix that Mr. Saunders's account of the same transaction is not to be reconciled with Dr. Zambelli's.

94. Will you point out to the Committee what are the statements of Mr. Saunders which you consider not reconcilable with this document?—At page 41 of the correspondence, Mr. Saunders says, "Dr. Zambelli is supposed to have stated that having informed him (Mr. Saunders) of Mr. Woodhouse's wishes, Mr. Saunders dictated the substance of a deed of gift, which Mr. Zambelli reduced into legal form. Mr. Saunders and Mr. Cortazzi (Vice-Consul) made some modifications of a formal nature in the draft, which Mr. Zambelli then took to Mr. Woodhouse, and read over to him word for word, slowly and distinctly, asking him to declare whether the document expressed his intentions. Mr. Woodhouse listened attentively, and stated that the document entirely expressed his wishes, and this statement he repeated on the following day, when the deed was formally executed. The facts, however, are not as represented in the foregoing extract, as I shall now proceed to explain." Mr. Saunders then says, at the bottom of the same page, "Dr. Zambelli, therefore, could never have intended to convey the impression that, after having first consulted with Mr. Woodhouse, and drafted a deed (said to have been dictated by me), which Dr. Zambelli reduced into legal form, and wherein some modifications were made by Mr. Cortazzi and myself, such draft Mr. Zambelli then took to Mr. Woodhouse, and read over to him word for word, slowly and distinctly, and that Mr. Woodhouse having then stated that the document entirely expressed his wishes, repeated this statement on the following day, when the deed was formally executed." That is a quotation which Mr. Saunders makes from my statement, and he then says, "This misapprehension, however, may well serve to illustrate how easily mistakes may occur in this mode of taking *ex parte* evidence, even when described as 'very distinct and positive,' and considered to have 'a very important bearing on the whole question,' which mistakes would certainly have been avoided by a more frank and courteous dealing towards me, and by suitable explanations on my part; but if the evidence of so intelligent a person as Dr. Zambelli, deservedly described as one of the highest repute, and thoroughly conversant with the English language, can be so unwittingly distorted," and then he goes on, "what must not be inferred of the miserable imputations ascribed to others," "scarcely capable of comprehending or responding with appreciable accuracy;" therefore I conceive that Mr. Saunders denies the accuracy of the statement which Dr. Zambelli made to me in reference to the preparation of the instrument.

95. Is there any other statement of Mr. Saunders which you consider at variance with this, or is that the only one?—Mr. Saunders proceeds to say, with regard to the inventory at page 44: "As regards a similar suggestion attributed to Dr. Zambelli" (that is to say, a suggestion from Dr. Zambelli to Mr. Saunders to make an inventory) "his own printed evidence refutes any such allegation, for he declares (at page 137) that after this (the execution of the deed on Saturday the 24th February) he had no occasion to be consulted, nor had he interfered directly or indirectly in the steps taken after Mr. Woodhouse's death, in order to secure the effects, either in the interests of the heirs-at-law, or of the British Museum; yet in the next paragraph but one, he is made to aver, that 'immediately after Mr. Woodhouse's death, Dr. Zambelli suggested to Mr. Saunders the propriety of having an inventory made of the collections, but Mr. Saunders declined to do so' (page 138). The former of these statements is undoubtedly the correct one, as fully confirmed by Dr. Zambelli himself."

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96. You called upon Mr. Saunders, and presented your letter from Mr. Panizzi to him?—Yes; the morning of my arrival at Corfu.

97. At what time?—I saw him at 10 o'clock.

98. What took place?—Mr. Saunders expressed great surprise on reading Mr. Panizzi's letter, and remained silent for a time, and he then asked me what antiquities I knew of that were missing. I state the result of the interview in my Report at page 38 of the Appendix; this, which I am going to read, is taken from my note-book at the time, and is as accurate an account of what passed between Mr. Saunders and myself as I could give: "Mr. Saunders having read the letter from the Trustees presented by Mr. Newton, expressed great surprise at the statement that many valuable objects were missing, and wished to know what they were. Mr. Newton having specified various objects, Mr. Saunders said that, Mr. Woodhouse having died intestate, he, as Consul, and by virtue of a treaty between Greece and England, administered to his effects; that immediately after his demise, seals were affixed to the rooms in Mr. Woodhouse's house, except in the case of those temporarily occupied by Maria Costantini; that coins and antiquities were found scattered in various corners and out-of-the-way places; that the seals were afterwards broken by his authority, and in the presence of a consular officer; that he himself, with Mr. Reichardt, examined the collection of antiquities with a view of selecting what might be considered as intended to be bequeathed to the British Museum; that the objects so selected were taken possession of by Mr. Saunders, and sent to the Museum, with an invoice signed by the two Trustees; that he never saw nor heard of the valuable missing articles specified by Mr. Newton; that Mr. Woodhouse was in a comatose state for several days before he died; and that many things might have been abstracted from his collection during those days. Mr. Newton then inquired whether any inventory of the antiquities and other objects found in the house after the decease, had been made by Mr. Saunders as Consul, and whether such inventory, duly attested by witnesses, had been registered by him in his archives. Mr. Newton also inquired whether the inventory known to have been made by Mr. Woodhouse himself had been found. Mr. Saunders stated, in reply, that no such inventory had been made by him as Consul, nor had the inventory said to have been made by Mr. Woodhouse himself been found. Mr. Newton then observed this was greatly to be regretted, as what was wanted was a duly attested document, under the seal of the Consul, stating what was found in the house after the demise. Mr. Saunders then related how the heirs had come to Corfu prepared to dispute the bequest, and how they had finally acknowledged it in a formal document, on receipt of which the remainder of Mr. Woodhouse's effects were handed over to them, including a number

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number of rings, which Mr. Saunders did not consider as antiquities. Mr. Newton then inquired whether there was any one about Mr. Woodhouse who might be suspected of having abstracted antiquities. He said yes; that Maria Costantini was suspected of having taken objects, that a stocking full of coins had been found in her house by the police, that she was suspected of having stolen 150 *l.* in gold, which was in the house at the time of the demise. Mr. Newton then asked Mr. Saunders to arrange a meeting between himself and Mr. Taylor the next day, in the presence of Her Majesty's Consul General." That is a note of the conversation which I made at the time, and I have nothing to add to it.

99. Was anybody else present at this conversation?—Perhaps one of Mr. Saunders's officers may have been.

100. Mr. *Egerton.*] Were those notes made from memory?—Yes.

101. You did not give Mr. Saunders an opportunity of reading over what you had written?—No.

102. How long after the interview were those notes made?—I cannot speak positively now, but no doubt they were made the same day.

103. You never sent them to Mr. Saunders for him to say whether they were correct?—No; I invited Mr. Saunders to make a formal statement at the end, such a statement as he was prepared to abide by; I invited him to revise it, and have it read over to him.

104. In your interview with Mr. Zambelli you did give him an opportunity of seeing what you had written?—Yes. I distinguish between statements which are made in the course of conversation and statements which persons are formally invited to make, notes of which are taken down at the time in their presence, as in my subsequent interview with Mr. Saunders.

105. Mr. *Lowe.*] Of course, when this report was sent to Mr. Saunders, he then became aware of what you had stated; can you refer to any place in the papers where Mr. Saunders comments upon it?—I am not aware that he challenges any of those statements.

106. You cannot point out any place where he notices them?—He notices the point about Mr. Woodhouse having died intestate. As I understood from his statement at the time, he took possession of the property by virtue of a certain clause which is in the Treaty of October 4th, 1837. That appeared to me to apply to the case of a person dying intestate, and therefore I so interpreted Mr. Saunders; but I think Mr. Saunders makes a remark upon that somewhere.

107. In page 40 of the Appendix, you make certain remarks on the interview which you had with Mr. Taylor, did Mr. Saunders give Mr. Taylor any advice during this interview?—I consider that when Mr. Taylor's statement was submitted to him for revision in Mr. Saunders's presence, and in my presence, that Mr. Saunders did give him advice as to the wording of certain answers, and I stated as much to Mr. Saunders in a correspondence with him, which is given in the Appendix.

108. Was it in anything material?—Yes; I think it was in material points.

109. Can you refer us to where that is?—At page 207 of the Appendix, in a letter to Mr. Saunders, I say, "I must remind you, once for all, that I gave Mr. Taylor a most patient hearing in your presence; that after having reduced his examination to writing as well as I could from memory, I submitted it to you for perusal, and at your suggestion made several alterations; that the next day Mr. Taylor, by my invitation, heard it read to him in your presence, that such corrections or alterations as Mr. Taylor wished to be made, were taken down by me in writing, then and there; that you assisted Mr. Taylor in wording his answers to my questions; and that, lastly, after all these corrections and alterations (some of them amounting to an absolute withdrawal of his original statement) had been made on the draft, it was copied out fairly by me, and once more read out to Mr. Taylor in your presence, Mr. Taylor having been invited by me to compare the fair copy as you read it out with the correct draft." I am prepared to repeat, that Mr. Saunders assisted Mr. Taylor in wording his answers to my questions, and I say that some of the corrections and alterations amounted to an absolute withdrawal of Mr. Taylor's original statement.

110. Mr. *Layard.*] Had you put down in writing the previous statement of Mr. Taylor; you say this statement which you allude to at page 207, did not agree with the statement previously made by Mr. Taylor, and he contradicted it in many material points; was the first statement taken down in writing?—That statement was put down from memory after the first interview.

111. And shown to Mr. Taylor on the second interview?—Yes; it was first shown to Mr. Saunders, who did not think it was accurate; it was then, by mutual agreement, shown to Mr. Taylor in his presence, and Mr. Taylor was invited to put in such answers as he was prepared to abide by.

112. You state that you met Mr. Taylor first at Mr. Saunders's house, and he made a certain statement, which you put down in writing?—Yes; but not then and there.

113. Did you show that statement to Mr. Saunders before the second interview?—Yes.

114. Did Mr. Saunders then accept that statement as a faithful record of what had taken place?—No.

115. Did he make any suggestion as to its correctness?—He told me that he thought there were several things in it that were not exact.

116. And then in consequence of that, you had a second interview with Mr. Taylor, and you submitted to him a memorandum of your recollection of what he had said at the previous interview?—Yes, subsequently to that; but I should mention that I should have invited Mr Taylor to correct that précis, whether Mr. Saunders had objected to it or not; it was not in consequence of Mr. Saunders's objections to it.

117. *Chairman.*] Is this a correct statement of what was done, that the alterations were first suggested by Mr. Saunders, and that then they were made by Mr. Taylor, and acquiesced in by yourself?—Some of the alterations were made by Mr. Taylor, with the aid of Mr. Saunders's counsel and suggestions, and the answer which was finally agreed upon by Mr. Taylor was accepted by me as Mr. Taylor's answer, and put down as such.

118. Mr. *Layard.*] Mr. Taylor declined to sign that second memorandum?—Mr. Taylor declined to sign that second memorandum, acting under the advice of his lawyer.

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119. Who was his lawyer?—Dr. Migliaressi. I told Mr. Taylor, in answer to Dr. Migliaressi's question, what use would be made of that document, that I did not know what legal proceedings might result out of it, and therefore he, acting under the advice of his lawyer, declined to sign that second memorandum.

120. He did not act in your presence under the advice of Mr. Saunders in refusing to sign it?—No; Mr. Saunders, on the contrary, I think, invited him to sign it; at least, I think he said that, subject to the approval of his lawyer, it was desirable that he should.

121. Mr. *Lowe.*] Did you point out in the presence of Mr. Saunders any discrepancy between the two statements of Mr. Taylor, between his first statement (which he made to Mr. De Fonblanque), and his subsequent statement?—I did not, because I did not know at all what use would be made of the evidence I was collecting. I considered that it was the property of the trustees, and that it might be used for legal purposes, and I did not think it necessary to submit the previous statement made by Mr. Taylor to Mr. De Fonblanque, or to confront it with his subsequent statement.

122. Mr. *Layard.*] At what page is his statement to Mr. De Fonblanque to be found?—At page 184.

123. Mr. *Lowe.*] You did not call Mr. Taylor's attention to that discrepancy before Mr. Saunders?—No, I did not, advisedly.

124. Mr. Saunders, in his correspondence, calls the notes of that conversation which you have referred to apocryphal?—Yes; the notes of the conversation of Mr. De Fonblanque with Mr. Taylor.

125. What have you to say with regard to that?—With regard to this particular conversation between Mr. De Fonblanque and Mr. Taylor, printed at page 184 of the Appendix, that is to say, the first part of it, which was what took place in the morning, what I have to say is that I heard it. We arrived at Corfu at five o'clock in the morning, and at about eight o'clock Mr. Taylor came and called on Mr. De Fonblanque. Mr. De Fonblanque and I occupied adjoining rooms; I was writing my letter to Mr. Panizzi in the room adjoining Mr. De Fonblanque's, and Mr. Taylor came into his room, and of his own accord made that statement. I noted it down then and there. Mr. De Fonblanque and I, immediately after the interview, drew up a *précis* of it, I having overheard it.

126. Calling your attention again to the pencil memorandum of Dr. Zambelli; is there not another point on which it is at variance with Mr. Saunders's statement, namely, with regard to the state of mind of Mr. Woodhouse. Mr. Saunders states, at page 13 of the Correspondence, "That the bequest was urged upon the deceased in his latter moments, when the context was not dictated by himself, and when obviously incapable of accurately appreciating the precise bearing of words and phrases supplied by others"; is that in accordance with what Dr. Zambelli says?—It appears to me that that is not in accordance with Dr. Zambelli's statement as to the state of mind of Mr. Woodhouse.

127. Mr. Saunders telegraphed to Mr. Panizzi, did he not, for his authority to prosecute Signora Maria Costantini?—Yes.

128. What have you to state about that?—Mr. Panizzi telegraphed back that he had no ground for proceeding against her or against anybody in particular at Corfu; but that the officer sent (meaning myself) had full power to prosecute anybody, either civilly or criminally, if he thought proper; upon that, Mr. Saunders requested me to call upon him, which I did, and having informed me of the telegram and Mr. Panizzi's reply, he told me that there was evidence showing that there was a strong suspicion of Signora Maria Costantini having stolen things out of Mr. Woodhouse's museum, sufficient to justify a search warrant, and for that evidence he referred me to Mr. Valaoriti; I then saw Mr. Valaoriti, and Mr. Valaoriti made to me the statement which I gave in my report at page 43. This statement Mr. Valaoriti repeated to me as having been made to him by Mr. Angelopulo, then acting as chief of the police: according to Mr. Valaoriti's statement to me, Mr. Angelopulo had said to him that he had gone to the Albanian, Leonidas, then in prison, at Mr. Valaoriti's suggestion, and that "hinting indirectly that he would have certain indulgences in prison if he spoke the truth, elicited from him the following statement;" I then gave the statement at full length. Upon hearing this statement from Mr. Valaoriti of what Mr. Angelopulo had told him as having been told him by the Albanian, I said that the first thing necessary before I could ask for a search warrant, was to see Mr. Angelopulo, who had seen the man in prison. I saw Mr. Angelopulo that night, and asked whether there was any written deposition of the Albanian's statement to him. Mr. Angelopulo said there was none; I said, "I do not think I can act in this matter without a written deposition, and some corroborative evidence." Mr. Angelopulo agreed to that; a delay of about a week took place, and at the end of the week he did produce certain depositions, of which he did not furnish me with a copy, but which he showed me in writing, and which led me to think that I was justified in asking for a search warrant.

129. Had there been anything said about depositions before?—At page 11 of the Correspondence, Mr. Saunders, in his letter to Mr. Panizzi, of June the 30th, had stated, "I have reason to believe from certain depositions which have just been communicated to me, that some of these [that is the missing objects] will be traced to the companion of the deceased, Mrs. Maria Costantini, or to some of the persons by whom she was herself recently robbed, one of these being a servant of the deceased, now in the hands of the police." That letter of Mr. Saunders to Mr. Panizzi was not communicated to me at the time it was sent. I think in the letter of July 13th he alludes to it again.

130. Did Mr. Saunders produce any depositions when he applied to you to prosecute the woman?—No.

131. Mr. Angelopulo had not got any?—Mr. Angelopulo had none to produce.

132. Do you know whether there were any depositions in existence?—Mr. Angelopulo told me that there were no depositions in existence. I state at page 45 of my report, "After hearing the Albanian's story again from Mr. Angelopulo, Mr. Newton repeated to him the observations which he had already made to Mr. Valaoriti. Mr. Angelopulo at once agreed in thinking that, before a denunciation could be made against Maria Costantini, the Albanian's statement must be

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be taken down in writing, which, up to this time, had not been done, and also, that the other persons alleged to have been concerned in the removal of the boxes must be questioned; that he would manage this through third parties so skilfully that Maria Costantini would suspect nothing." I mentioned, next day, to Mr. Valaoriti what Mr. Angelopulo had told me, upon which he remarked that if once we began questioning people about these proceedings, Maria Costantini would hear of it, and then the search would be useless. I said I could not help that, but I could not commit the Trustees to such a step without something like the evidence before me which was expected in England when a search warrant was asked for.

133. With regard to the gold ornaments described in the statement made to you at Corfu; had any of them been seen by others in Mr. Woodhouse's possession?—Yes; the list I made at Corfu was compiled as best I could from the descriptions of the peasants there; that list, which is given in the Appendix, has been submitted, since it has been printed, to persons who had seen the collection; Lady Strangford has recognized certain objects described by the peasants. Here is a statement (*producing a paper*) signed by her, of what she recognised from my descriptions, and which states at the bottom, "I remember quite well seeing all the objects mentioned above, when Mr. Woodhouse showed me his collection at Corfu, in June 1863."

134. The peasants appeared to have given you correct information?—My impression is generally that the peasants were speaking the truth; that each man was speaking as to a particular object that had passed through his hands, and made an impression upon him at the time.

135. Having compared the list of missing objects, as stated in the Appendix, with the collection in the hands of Mr. Woodhouse's nephews, can you mention what objects are still missing?—The gold ornaments I give in my list of missing objects are still missing, with the exception of half an earring, and a few scraps which the nephews showed me. There are also remarkable objects among the bronzes missing; I have noted them in my report, which is printed at page 73 of the Correspondence. I say, "There are also many bronzes in Mr. Newton's list of which the heirs have no knowledge; such, for instance, as No. 11 (at page 91 of the Report). No. 11 is, "Figure of Greek Warrior holding a Spear, said to have been found at Cassope, in Epirus, in a well, and to have been given to Sir Frederick Adam by a peasant there; in fine condition and about two feet high; Mr. Woodhouse paid 133 dollars for this." Several people, among them General Yorke Moore, attest to the fact of having seen that in Mr. Woodhouse's collection; that is a remarkable object, and certainly is not in the collection we have.

136. Are there many objects still missing?—I consider, supposing my list of missing objects to be exact, many of the most valuable objects in the collection are still missing.

137. Mr. *Layard.*] They are neither at the British Museum nor in the hands of the heirs?—No.

138. *Chairman.*] The heirs permitted you to inspect the collection?—Yes, they told me that what I saw was the whole collection which they had received, and that at the time of making it over they made an inventory of each article they received.

139. Mr. *Lowe.*] You did not communicate the statements that you collected at Corfu to Mr. Saunders; why did you not give him an opportunity of cross-examining the deponents?—Because I was the agent of the Trustees, and I considered that all those statements belonged in the first instance to them, and that it was for them to determine the use that might be made of them I could not tell that they might not be used for legal purposes, and therefore I did not communicate them to Mr. Saunders without the authority of the Trustees; I did, however, take the only steps possible then for confronting Mr. Saunders with certain witnesses who had made statements to me which I thought it was very proper should be made in his presence. Those steps are given in a letter, at page 17 of the Correspondence which I wrote to Mr. Erskine, in which I propose that if the Foreign Office and the British Museum would agree, the inquiry in which I was engaged should be conducted in his presence and in the presence of Mr. Saunders

140. Mr. Taylor, as appears by his evidence apprised the heirs by telegram of the death?—Yes.

141. And therefore the heirs knew of the death a week before Mr. Panizzi heard of it, the letter to the British Museum being sent by post?—I presume so.

142. In your capacity as Consul, have you had to take care of the effects of deceased British or Ionian subjects?—Yes; both in Turkey and in Rome.

143. From your experience in such matters can you offer any remarks on the proceeding that we have been investigating?—It appears to me that Mr. Saunders certainly took possession of all Mr. Woodhouse's effects after the demise and the keys of the house and the rooms were as he states to me, always in his possession. He first of all placed seals upon the doors, he afterwards in certain cases removed those seals, and certain objects were left in the house, and certain objects were transferred to his own house. I seems to me that in a case like that, as Consul, he should have made a notarial act, an act of this nature: "That on such a day, I, a British Consul, or as Vice Consul, went to such a house, found such and such things, sealed up such and such things, or removed such and such things (as the case may be)," and which document should have been attested by witnesses That document would have shown what he found in the house, whether he found a will or a register of the antiquities, and would have shown what he took away from the house. And it appears to me that every time the seals were broken, there should have been some record of that kind of it. That is a precaution which I should have taken, and I learnt, from looking back through the archives of my consulate, that that is a course which my predecessors had adopted.

144. Mr. *Layard.*] What kind of an inventory is usually made by consuls abroad on the death of a British subject without a will or in the absence of heirs; supposing a man had coins or antiquities, would a consul take an actual inventory of every object and every coin?—In a case where I took over valuable property, I should take the best inventory I could make under the circumstances; it might be that the property was of a

nature that I did not understand sufficiently to describe it very accurately, but I should make, according to the amount of time and assistance I had, such a schedule of all I found as would enable one to state afterwards, "These things, and these only, are what I found, and here is an attested document."

145. Supposing the case of a box of coins; would you, when a consul, have said a box containing so many coins, or containing such and such coins?—Supposing the time and other circumstances admitted, and I had sufficient knowledge, I should make the inventory as specific as possible; that is to say, so many coins of Philip of Macedon, and so on. If time and circumstances did not permit, I should make it more general.

146. Are there not very few consuls who would have sufficient technical knowledge of coins to make out such list as you now suggest?—Certainly a consul could not be expected to make such a catalogue as a numismatist would make; but the distinction between gold and silver is one which every consul might make.

147. Mr. *Lowe.*] Mr. Saunders urged that it was a complicated affair to make an inventory, that it was not his business, and that there would be delay; have you anything to say with regard to these points?—With regard to its not being his business, the view I take of it is this: either it was his business to have it made, whether by his own officer or by the administrators, or else in case of their declining to do so, and hindering him in doing so, I should say that Mr. Saunders ought not to have taken charge. Having taken charge he was responsible for the custody, and therefore an inventory ought to have been made.

148. With regard to complication, what do you say?—Supposing the number of objects was very great, and to describe them all accurately would have taken much time, and been very complicated, I should have taken the most valuable, and made a more general inventory; and then with regard to the rest, such, for instance, as terra cotta lamps; I should say "A case full of terra cotta lamps," they might have been counted, as for instance, one hundred terra cotta lamps in case; but in the case of gold objects, trinkets, and jewels obviously of value, they should certainly have been counted.

149. With regard to the question of delay, what do you say?—Mr. Saunders was in possession from the day of Mr. Woodhouse's death, February the 26th, till the arrival of the ship on March the 10th. I think that that was more than time to make such an inventory as I am describing.

150. There was an inventory made of the things sent to the British Museum?—Yes.

151. That was the more pressing of the two, was not it?—That inventory was made after the ship of war arrived, I presume.

152. Mr. *Layard.*] By whom was the inventory made?—I think Mr. Saunders states in one of the papers how it was made; it purports to be an inventory given to Mr. Saunders by the administrators.

153. Not made by Mr. Saunders himself, but by the administrators?—I think it was made by Mr. Taylor, with the assistance of Mr. Reichardt, but upon that I think Mr. Saunders gives specific information in one of his reports.

154. Was that inventory full and satisfactory?—It was an inventory enabling us to count the number of coins; so many silver coins, and so on; it was a skeleton inventory.

155. It was not in Mr. Saunders' handwriting?—No.

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156. Mr. *Lowe.*] That inventory is headed, "From the Collection of Mr. Woodhouse"?—Yes.

157. It is said that that ought to have informed the Trustees and yourself that we had not the whole of the collection, but only a selection; what do you say to that?—I went by the words of the instrument itself, and by Mr. Saunders' own words, and I did not pay any particular attention to the inventory, except as to the things in it; the inventory was not signed by Mr. Saunders, nor legalised by him. On referring to the original document, I find that the signatures are not legalised by Mr. Saunders.

158. Mr. *Layard.*] The inventory is signed by the two trustees, Mr. Taylor and Maria Woodhouse, who is Maria Costantini?—Yes.

159. And this is the inventory which Mr. Saunders sent over?—Yes.

160. Speaking from your consular experience, you do not consider this a consular document?—No.

161. You consider it merely a private document drawn up by those two individuals, and transmitted by the Consul?—Yes.

162. Did Mr. Saunders give up possession of the remainder of the collection to the heirs as soon as he had sent the things by the "Enterprise," to the British Museum?—The heirs called upon him to recognise them as heirs-at-law, and he declined to do so till they had recognised the donation made to the Museum, which they did, in the document, at page 173 of the Appendix, upon which he put them in possession of the effects in Mr. Woodhouse's house. From his statement to me, I find that he put them in possession without taking any general receipt of the antiquities so handed over, or without any inventory being made of what they took; consequently when I asked him, on my arrival at Corfu, "What did the heirs take?" he said, "I cannot tell; they took the effects generally."

163. Minus what had been sent to the Museum, I suppose?—Yes. At page 153 of the Appendix, Mr. Saunders states to me, in the presence of Mr. Erskine, "Does not know whether the heirs made an inventory; does not know what antiquities they took."

164. Do the heirs appear to have known of what was sent to the British Museum, that any portion of the antiquities was so sent?—In this same page 153, Mr. Saunders, in answer to a question from me, says, "Does not know whether the heirs ever saw the invoice sent to the British Museum;" and Mr. James Woodhouse, in an interview I had with him a short time ago, stated to me that Mr. Saunders never exhibited to him or to Mr. Puddick that list of the antiquities sent to the British Museum, which I call an invoice, and which Mr. Saunders calls an inventory.

165. In your own Report, at page 74, I see you say that the heirs state that Mr. Saunders gave no hint to them that various other antiquities had been assigned to the Museum, and that he never exhibited to them a copy of the invoice sent to the Trustees?—Yes, that is the statement to which I refer.

166. That is the statement that they made to you?—That is the statement that they made to me.

167. Mr. *Lowe.*] Have you anything further to say, as to any further steps that ought to have been taken when it was found that there was no catalogue of Mr. Woodhouse's collection?—It appears

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appears to me, considering that Mr. Saunders states that Mr. Woodhouse was surrounded by suspicious characters during his last illness, and that when he entered the house on the morning of the demise, the antiquities and coins were in disorder, it would have been a very natural and proper precaution to have inquired very particularly whether Mr. Woodhouse had not made, in his lifetime, a register or catalogue of his collection; and not finding such a catalogue in the search that was made, as Mr. Saunders and Mr. Taylor both state, I think a special note of the fact should have been taken; and I think then would have been the time for Mr. Saunders to inform himself, from persons in Corfu who knew Mr. Woodhouse's collection, as to whether the antiquities which he found there were all that they remembered. I conceive that it was just as easy for Mr. Saunders then to obtain that information as it was for me to obtain it, coming as a stranger, three months afterwards; and there were persons who knew the collection who were very well known to Mr. Saunders, such persons as Mr. Valaoriti. With regard to Mr. Valoriti, I may state that M. François Le Normant, of Paris, having seen the collection, I asked him before I went to Corfu whether he could give me any information about the missing objects, and his remark to me was, "The best person you can apply to is Mr. Valaoriti; he knows the collection better than anybody;" and there were Dr. Luzi and other people, whose evidence appears here.

168. As a matter of fact, there had been such a catalogue?—That is positively asserted by several witnesses. Mr. De Fonblanque asserted it in the most positive manner before I went to Corfu; and in consequence of his having so asserted it, it was thought desirable that he should accompany me to Corfu, that he might be prepared to prove that fact, if any legal proceedings were taken there.

169. Mr. De Fonblanque is a Commissariat officer?—He was commissary-general at Corfu.

170. *Chairman.*] Where is he now?—In London, I believe.

171. Mr. *Layard.*] As to that catalogue, did you hear any evidence at Corfu which convinced you that such a catalogue existed?—I heard from several persons a confirmation of Mr. De Fonblanque's statement, that during the lifetime of Mr. Woodhouse such a catalogue had been seen in his hands. I have here a letter from a German gentleman who also states that, but I did not hear at Corfu any statement that it existed after the demise.

172. Have you ever seen any person who actually himself had the catalogue in his hand, or seen the catalogue?—Mr. De Fonblanque says as much, I think, in a letter printed here.

173. Has Mr. De Fonblanque stated to you that he has actually seen this catalogue?—Certainly.

174. Did he state to you his belief that that catalogue was a full catalogue of the collection?—A general catalogue of the collection.

175. Has anybody but Mr. De Fonblanque made that statement to you?—Yes, several persons whom I quote in my report. At page 3 of the Appendix, I say, "Mr. Woodhouse kept a very exact register of all his antiquities, entering each article as he bought it, with a note of the price, and the source whence it was obtained. This register is no longer to be found; but the fact of its existence in the hands of Mr. Woodhouse is attested by the evidence of Mr. De Fonblanque (Enclosure 6). Of Mr. Woodhouse's old servant Salvatore Fanti, of the Signora Maria Costantini, Mr. Woodhouse's companion for upwards of 50 years (Enclosure 7), and of Spiridion Grammatiko (Enclosure 12)." Since this report was written, I have received from Germany a letter from Professor Vischer, of Basle, who said he also saw that inventory.

176. The impression upon your mind, after hearing the evidence at Corfu, was that such a catalogue had been in existence?—Yes.

177. You formed no opinion as to what became of that catalogue?—No.

178. There is no evidence to show that that catalogue was in the possession of Mr. Woodhouse at his death?—No.

179. Or found in his house after his death?—No.

180. That was not stated by any witness at Corfu to you?—I think there was some statement by Genevra Ceccoli; but I did not lay any stress upon that in drawing up the report.

181. Mr. *Lowe.*] That catalogue is not forthcoming?—No.

182. Mr. Saunders laid some considerable stress in his correspondence upon the fact of the Trustees having sanctioned his interpretation of the document, signed by Mr. Woodhouse; can you refer us to any place in the earlier part of his correspondence, before you were sent to Corfu, where Mr. Saunders gives to the Trustees his interpretation of that document?—No; I have read with the greatest attention his official Despatch, announcing the demise, and I have also read his private letter to me, and I cannot discover in either of those documents any indication of the limited sense in which he interprets the words "coins and other antiquities."

183–4. In what senses does he interpret them; in more than one, does not he?—In his letter on June the 30th, he says, "The introduction of the words 'and other antiquities' was solely and entirely due to myself, so inserted with the special object of covering, together with the coins, the remarkable necklace, with gem pendants, from a tomb in Ithaca, which it was understood the deceased intended for the British Museum;" and in a subsequent letter he speaks of having inserted those words, "to cover, together with the necklace, such objects as were recoverable from the heirs, as I understand him, or such objects as were thought of interest to the Museum."

185. Mr. *Layard.*] Did you receive amongst those things that Mr. Saunders sent home, any objects that could be classed neither amongst coins nor antiquities?—There were three stones described as meteoric stones; there was a brass seal of Zante, I think, which might be called a curiosity, but hardly an antiquity.

186. You would not call meteoric stones antiquities?—No; I have been informed by Professor Maskelyne that they are not meteoric stones, and that they are of no value: with regard to the brass seal, that can hardly be called an antiquity; and then there is a Chinese lamp in the form of a toad, which I believe to be entirely modern.

187. Mr. *Lowe.*] Speaking still of the period before you went to Corfu, was any intimation given to us that Mr. Saunders had exercised any power of selection on the collections: does he give us, before you went to Corfu, any intimation that he had selected certain objects and sent

them to us?—No; I cannot find any in his letters.

188. As a matter of fact you say, at the Museum, there was no idea of the kind?—No; the only thing that could be construed into an indication that a selection had been made, is the report from Mr. Saunders, dated March 19th, which reached us on May the 1st, with the collection itself, informing us that they were coins and antiquities from the collection of Mr. Woodhouse; that is in the Correspondence; it is a short letter addressed to the trustees, and is to be found at page 64 of the Correspondence. It is dated the 19th of March; he says, "I have embarked on board Her Majesty's ship "Enterprise," proceeding to Malta, a large case, lined with tin, containing eight sealed boxes of coins and other valuables, from the collection of the late James Woodhouse of this place, whereof a detailed inventory will be forwarded by post." That letter reached us, with the coins and antiquities, on the 1st May.

189. Are you aware of any memorandum from Mr. Woodhouse to guide the trustees of Mr. Woodhouse's estate in the selection they made?—No such memorandum has, as yet, been produced by Mr. Saunders.

190. Had Mr. Saunders any authority from the Trustees of the British Museum to make any such selection?—No, Mr. Saunders had no authority from the British Museum to make any such selection; Mr. Jones has stated so.

191. Have you anything more to state upon that question of selection?—I think if Mr. Saunders and Mr. Taylor made that selection without authority, as I conceive they did, that at any rate the Trustees of the British Museum had a right to be informed at the time, in the most explicit terms, that in the peculiar circumstances of the case, they, in the absence of a person sent out from England, had made the selection. Mr. Saunders states, that he made a requisition for a competent person to come out. I certainly, at the time, did not take it as a requisition on reading his letters of the 26th of February, but as an alternative and option presented to us. He says because we, acting under the advice of the Foreign Office, did not send out that person, therefore he was obliged to get from the administrators of the deceased what he could. I conceive that, in any case, he was bound to inform the Trustees that he had done so.

192. Was not it found that Mr. Woodhouse had prepared another strong box besides the one we have heard of?—I had at Corfu the evidence of several persons with regard to that strong box which I had better quote.

193. *Chairman.*] This is still evidence not seen by Mr. Saunders till it was printed?—Yes; the principal evidence is at page 127 of the Appendix; the evidence of Giuseppe Grasso, the carpenter, who made the boxes. They are also mentioned by Salvatori Fanti, the servant of Mr. Woodhouse, and the heirs of Mr. Woodhouse. Either Mr. Woodhouse or Mr. Puddick, in my interview the other day, stated that they had found a strong box lined with tin, in which they had packed some things, and which, from their description, seemed to correspond with the second box described by Grasso.

194. Mr. *Lowe.*] After all, did not Mr. Saunders make a compromise with the heirs?—It would appear from his view of the transaction, that by handing over to the heirs undisputed possession of the remainder of Mr. Woodhouse's effects, including a large number of antiquities, he did make a compromise, securing, before he did so, their recognition of the donation to the British Museum.

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195. Does the document at page 5 (*Petition of the Heirs to Mr. Saunders*) speak of antiquities at all?—No.

196. It only speaks of coins?—It only speaks of coins.

197. What inference do you draw from its only speaking of coins?—It would not be for me to say whether the document of page 5, though not containing the word "antiquities," would not apply; but from Mr. Saunders's letter of March the 27th to us, and the letter to Lord Clarendon of the same date, I supposed that he considered that the heirs had recognised the entire donation.

198. What objection have you to this so-called compromise?—My first objection to it is, that if it was a compromise, it was made without any authority from the Trustees of the British Museum, and was never reported to them as such afterwards; and I conceive that if Mr. Saunders thought that the circumstances of the case were so urgent that some such compromise ought to have been made there and then, he ought to have applied by telegram to the Trustees for authority to make it; either for a person to be sent out from England to make it, or for authority to make it himself.

199. Mr. *Layard.*] Have you ever had a similar case to the present, of a bequest of antiquities by a person living abroad, and those antiquities being sent home by a consul?—No, I think not.

200. You have seen, you state, the collection in the hands of the heirs of Mr. Woodhouse?—Yes.

201. Can you state to the Committee the comparative value of the two; that is, that part of the collection in the hands of the Trustees of the British Museum, and that part in the hands of the heirs?—I should not like to state, without making a regular valuation.

202. Would they be of about equal value?—I understand from Mr. Vaux, the keeper of the coins, that there are a great number of duplicates among them, and that it is not a collection of very high value; but I do not think he could state positively what that value is. With regard to the part of the collection in the hands of the heirs. I should not like positively to state the value of it; I consider that it contains a number of very curious things which were matters of great interest to me as coming from tombs at Corfu.

203. You state in your report, at page 67 of the Appendix, "Mr. Saunders then proceeded to divide the antiquities found in the house into two unequal portions; the smaller of which portions he assigned to the British Museum, the larger to the heirs of Mr. Woodhouse:" do you mean larger as regards number, and not as regards value?—I mean larger in bulk; I did not give any opinion as to the value.

204. Mr. *Lowe.*] It was urged that we should have lost all if this had not been done; what do you say to that?—That depends upon whether the heirs would have insisted, if this had not been done, in referring the will to the local tribunal; and then it must be assumed that the local tribunal would have given an adverse decision, which we do not consider to be in any way proved.

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Dr. Zambelli told me that he considered the instrument to be good in Greek law, though the lawyers retained by the heirs seem to have expressed a different opinion. Then, again, there was another alternative, which was to come to this understanding with the heirs and administrators: to say to them, "You are disposed to put one construction upon this will, or to dispute it; we are disposed to put another. Let us, in the interest of both parties, send the collection out of the country by ship of war under sequester, addressed, for instance, to the Foreign Secretary, and then let us settle our dispute in England afterwards." That is the course which I conceive I should have pursued if I had been sent out, and I think it would have been far more to the interest of the Museum.

205. That is the course which you would have pursued if you had gone out yourself?—Supposing the heirs had resisted my interpretation of the instrument, and they had been willing to send the whole home under sequestration, I should have made that proposition to send it home under sequestration, and consigned the whole collection to some neutral person like the Foreign Secretary.

206. Is there anything else that you would wish to add?—I am not aware of anything.

207. Mr. *Layard.*] Have the Trustees of the British Museum taken legal opinion upon the validity of that testamentary instrument?—Mr. Jones would be able to answer that question.

208. Mr. *Egerton.*] Did you hear whether there was any doubt raised in Corfu with regard to the validity of this bequest?—Yes; Dr. Migliaressi, Mr. Taylor's advocate, and Sir George Mercoran, who was retained by the heirs, told me so.

209. Was that in consequence of the laws of Greece not allowing the export?—No, in reference to the form of the instrument itself.

210. From what you heard, was there any reason to doubt the state of mind of Mr. Woodhouse at the time of making this bequest?—No, I heard nothing to lead me to doubt his state of mind.

211. When did you first hear of the intention of Mr. Woodhouse to leave this collection to the British Museum?—Some time in the year 1863; and I think the first person who spoke to me about it was Mr. Edward Bunbury, who was a numismatist, and had just come from Corfu.

212. Was it well known in Corfu that he intended to leave it to the Britsh Museum?—I believe it was a matter of public notoriety. Sir Henry Storks spoke to me at the time as if it was a matter generally known, and so did Sir Drummond Wolff.

213. I think the first intimation sent out as to how those effects were to be disposed of was contained in a telegraphic despatch, was it not?—The first instruction given to Mr. Saunders, in answer to his two letters of 26th Febuary, was a telegraphic despatch, which was in pursuance of the requisition printed at page 2, from me to Mr. Layard. I was directed by Mr. Panizzi to apply for that telegram.

214. To send the things home in the manner suggested by Mr. Saunders' Despatch?—Yes.

215. I think, upon the 2nd of May, Mr. Panizzi sent this letter to Mr. Saunders (page 6 of the Correspondence): "I am directed by the Trustees to express to you their especial thanks for the zealous and successful exertions which you have made to give effect to the intentions of the donor, and for the careful manner in which you have superintended the packing and transmission of Mr. Woodhouse's donation." When was it that you had reason to alter your opinion?—In the course of the month of May; the letter of the 2nd of May was written the day after I had unpacked the cases, and compared the objects sent with the invoice.

216. And then it was you found out that a certain number of things were not contained in the cases?—I found that three things, the only three that I knew of, were not there; and in consequence of that I wrote to Mr. Merlin about those plates.

217. Before Mr. Woodhouse's death, had you any conversations with Mr. Saunders upon the subject of getting this collection for the British Museum?—I saw Mr. Saunders twice; he called on me, I think, at the British Museum, when he was in England, which, I think, would be about the autumn of 1864. Mr. Saunders will know when he was in England; I have no note of the exact date. And then I saw Mr. Saunders again when I called at Corfu, as I have already stated, which was in May 1865.

218. Did you hear from Mr. Saunders upon that occasion that there would be great difficulty in persuading Mr. Woodhouse to make the bequest to the British Museum?—I do not remember hearing that.

219. Was anything said about there being any difficulties on Mr. Woodhouse's part?—I have no note of the conversation at the time; but I do not remember anything particular being said, except the general fact that he had always been very reluctant to make a will.

220. Was nothing said as to his disinclination to make over this bequest to the British Museum?—Not to my knowledge.

221. Just recollect yourself?—I have no recollection of it.

222. In your own report, at page 34, you say, "Immediately on receiving Mr. Saunders' letter, Mr. Newton had an interview with Mr. Panizzi, and stated that he was ready to start for Corfu that evening; but that as difficulties in reference to the exportation of antiquities might be raised there, it was a question whether it might not be more prudent to leave this matter in the hands of Her Majesty's Consul General, who, being on the spot, would know best how to overcome any local opposition, and to whom Mr. Newton had already explained all the difficulties of the case when he saw him in the autumn of 1865." Are you sure that no other difficulties besides those mentioned there were mentioned at that time?—I have no recollection of any difficulties, except the general difficulty present to my mind, that a man of that great age had not already made a will, and that he might die any day without making it; but certainly I never contemplated any influence being brought to bear upon him to force him to make a will. I had no authority to do so from the trustees.

223. Did you receive any letter from Mr Saunders on the day of Mr. Woodhouse's death, on the 26th of February 1866?—I received a letter on the 7th March, which was dated the 26th of February.

224. Is that the letter which has been already spoken of to-day?—The one printed in the Appendix; it is at page 63 of the Correspondence.

225. Did you receive any other letter from Mr. Saunders, besides the one now referred to, bearing the same date?—No.

226. That is the only one you received?—Yes, that is the only one bearing that date.

227. Did not Mr. Saunders in that letter suggest to you that you should go to Corfu yourself, for the purpose of making a selection?—He mentions that as an alternative, but I cannot say that I thought at the time he particularly recommended it.

228. Was any specific instruction given to Mr. Saunders?—The first specific instruction was the telegram of the same day, which has already been before the Committee; and the other specific instructions were Mr. Panizzi's letter, dated 7th March 1866, which is at page 195 of the Appendix, in which Mr. Panizzi instructs Mr. Saunders to pack the collection in a secure manner, and tells him that he thinks it preferable that it should be sent entire, in accordance with the terms of the donation, rather than that any selection should be made.

229. Were any other instructions given to Mr. Saunders besides those from the British Museum?—None that I know of. I gave none.

230. Do not you think that it would have been fairer to Mr. Saunders if some specific instructions had been given to him exactly how to act?—Mr. Saunders wrote to us, stating that he proposed to send certain things home by a ship of war. He did not state that there were any difficulties in it, and the only instruction we could give him was to send the things home and entirely. As to any specific directions that could have been given, I do not know what they could have been; it would not have occurred to me to write to Mr. Saunders, "Make an exact inventory of everything that you take charge of."

231. During the time you were Consul, were you left to your own discretion to make selections, and to send the things so selected to the British Museum?—Never, where a selection had to be made from property bequeathed to the British Museum; and as the keeper of a department, I never should think of making any selection without placing the fact on record, and getting the sanction of the Trustees, both before and after.

232. You were well acquainted with many of those objects in Mr. Woodhouse's collection yourself, were you not, at this particular time; you had been there in 1863?—I only saw the collection, to the best of my belief, for two or three hours. I was not at all acquainted with the collection; in fact, the exact state of my knowledge is represented by that letter to Mr. Panizzi, which is already before the Committee, written immediately afterwards.

233. From your own knowledge of those things you do not know that a great many things are missing from the collection?—No; and it is an exceedingly difficult thing to get evidence to prove that objects were in the collection which are now missing. The existence of the silver lamp was discovered by me by mere accident, by turning over the pages of a German book. The plates I certainly did know of, and the number of gold ornaments I could only guess by comparing the statements of persons who had seen the collection, whom I had to find and bring to the Museum between the 20th of May and the 4th of June, when I left England; and in fact when I left England my information was so slight that I did not even then remember that I had written that letter to Mr. Panizzi immediately after seeing the collection in 1863, and I begged Mr. Panizzi to make search among his archives to find if there was such a letter; that was all I knew about it.

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234. Were you aware that Mr. Woodhouse had those relations?—I knew that he had a nephew.

235. Was it your belief that he meant to disinherit all his relations in favour of the British Museum?—My knowledge on the subject was entirely derived from his statements to me, without making any allusion to heirs-at-law or nephews. He said, I am going to leave my antiquities to the British Museum; I did not think it my business to inquire further.

236. Did you bring before the notice of the Trustees that there were heirs interested in his property?—I did not bring it before the Trustees in any official document previous to the demise; I probably informed Mr. Panizzi in conversation that I had heard that there was a nephew.

237. Are you able to state whether the Trustees had any official notification made to them that there were heirs who would very probably dispute the bequest?—I cannot say I ever heard of such a notification; but Mr. Jones is the person who would be able to answer that question, because he is the confidential officer of the Trustees; I never heard of such a notification.

238. When you were in Corfu in 1863, and were made cognisant of the probable intention of Mr. Woodhouse to leave this collection to the British Museum, did you hear anything of any intention on the part of those heirs to contest the validity of the will?—I heard nothing of any intention on the part of the heirs to contest it.

239. Did you hear that there were heirs-at-law in existence?—I heard that there were heirs-at-law in existence, but I did not hear that they intended to contest the will.

240. You thought they would acquiesce in the whole property being left away from them?—I had no reason to apprehend the contrary.

241. When you went to Corfu on the last occasion, did you take any written authority from the Trustees of the British Museum?—I took a power of attorney.

242. Authorising you to proceed criminally as well as civilly?—Yes.

243. Did you meet with any opposition on the part of Mr. Saunders to any of your proceedings?—No.

244. He gave a cordial support to you in all your proceedings?—Mr. Saunders was good enough to answer all the questions I put to him, and I cannot say that he refused to give me any assistance.

245. Did he withhold any co-operation with you in the matter about which you had come; you represented to him the exact purpose for which you had come?—Yes; the letter I brought from Mr. Panizzi represented that; that is printed at page 65 of the Correspondence.

246. "I am directed by the Trustees of the British Museum to acquaint you that they have received information which induces them to believe that many valuable articles belonging to the late Mr. Woodhouse's collection of antiquities, and which were intended by him to form part of his donation to the British Museum, have not been received with the rest of the collection. The Trustees have therefore sent Mr. Newton, Keeper of the Classical Antiquities in the Museum, to Corfu, in order to make inquiries on the subject, and I am to express their hope that you will render such assistance as may be in your power in furtherance of this public object."

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object." That is the letter which you considered gave you full authority to act in the way you describe?—Of course, in the matter of the denunciation against Maria Costantini I acted by the authority of the power of attorney.

247. You did not go on with any prosecution against Maria Costantini?—No; as far as the action of the trustees was concerned it dropped.

248. How did you obtain the evidence of those peasants who you say had been in the habit of selling things to Mr. Woodhouse?—I was led to inquire as to things found in a certain district called Agia Elena, by a passage in a work of Mustoxidi, "Delle Cose Corciresi," in which he stated, that about 1846 or 1848 a quantity of tombs had been discovered with gold ornaments and various other things; and on inquiring, I found there were a number of peasants living in that district who remembered opening of the tombs and finding the things and selling them to Mr. Woodhouse.

249. Did you give any public notice, offering a reward to those peasants who would come forward and give evidence?—No; I paid the peasants what I considered a fair compensation for their loss of time. I inquired what was given to witnesses in Corfu. I gave two drachmas a day each to the men who came and gave me evidence.

250. Did you make it known that anybody who would come forward and give evidence would receive two drachmas a day?—Of course the fact became known.

251. You think that that evidence was perfectly disinterested?—I think they spoke the truth, as far as I can judge.

252. Where was the notice given?—I gave no public notice; I let it be known.

253. What means did you take of letting it be known?—I told the persons who brought me such evidence to bring other persons if they knew of any.

254. Giving them two drachmas at the time?—I paid them at the time.

255. So that all the peasantry in the neighbourhood had an interest in coming and receiving those two drachmas a day?—So far they had an interest.

256. What is two drachmas a day equal to?—Two francs.

257. What is the ordinary rate of wages a day in Corfu for a day labourer?—I think that is about the rate; I speak without positive knowledge.

258. Did they give you an accurate description of those things that they had sold?—Of course their description varied in accuracy; some of their descriptions were much more accurate than others, according to the intelligence of the particular man.

259. Mr. *Beresford Hope.*] Was that the test which you applied to their veracity?—The test which I applied to their veracity was the consistency of their statements. I did not believe that the men could have invented the particular details which they put in. I speak as a person who has been in the habit of examining Greek peasants, with the view of spending the public money in excavations. The peasant is the person who, in the first instance, tells you where to dig.

260. Mr. *Layard.*] Have you had much experience with Greeks?—I once lived with Greek peasants six months, and never spoke a word of English the whole time.

261. Where was that?—In the Island of Calymnos.

262. Mr. *Egerton.*] At page 105, it is stated, that one of those articles, three gold snakes, cost Mr. Woodhouse 45 dollars?—Yes; that was the statement made to me.

263. By one of the peasants?—That is the deposition of a broker; he came to me, in the first instance, and said that he could give me information as to what was in the museum of Mr. Woodhouse.

264. Have you seen the remainder of the collection which is now in the hands of the heirs?—I looked it over one day by their invitation.

265. Did you see many of the things you had recollected to have seen in Mr. Woodhouse's collection?—Yes; I recognised certain things which are stated in my report to the Trustees, at page 72.

266. Did you mention to Mr. Saunders, in the interview which you had with him previous to the death of Mr. Woodhouse, that you should hardly be able to recollect the things if you saw them?—No; I do not remember saying anything on that subject.

267. You do not recollect that?—No.

268. When you state (page 73 of the Correspondence), "The disappearance of the many precious objects, such as necklaces, diadems, earrings, &c., which, from the testimony of those who knew the Museum in Mr. Woodhouse's lifetime, were one of its principal features has still to be accounted for," have you any evidence to show that those articles were in his possession at the time of his death?—No; I have no evidence to show that anything was in his possession at the time of his death except the things found in the house.

269. There had been a theft committed by one of his servants?—There had been a theft in the house of Maria Costantini by the Albanian.

270. You are not able to say whether any of the things had been missing out of Mr. Woodhouse's house before the demise?—No, I cannot say.

271. This servant of Maria Costantini, the Albanian, had access, of course, to Mr. Woodhouse's house?—The Albanian was one of Mr. Woodhouse's servants.

272. He was found guilty of theft on Maria Costantini?—Yes.

273. You cannot tell whether that man may not have had access to Mr. Woodhouse before his decease?—He was in the house at the time, and what amount of access he could have had to the articles, and what amount of custody there was of them, I have no certain information.

274. So that there is no certain evidence that the things were in the possession of Mr. Woodhouse at the time of his death, beyond the fact of Lady Strangford having seen them in the year 1864?—Lady Strangford having seen them in the year 1863, and the other persons who are enumerated in my report having seen them at the dates mentioned.

275. What is the latest date at which you can show that those things were in the possession of Mr. Woodhouse?—The latest date is General Yorke Moore's letter to me at page 227.

276. What was the date of that?—October the 20th, 1866.

277. That is the date of the letter, and not the date

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date when he saw the articles?—He saw them in January and February 1865. There is a statement with respect to something that was bought three months before his demise, but it is a statement of a Corfu witness; so that it is better to take the statement of what an English gentleman saw in January 1865.

278. According to that, that leaves more than a year during which, as far as we know, there is no evidence of anybody having seen those things in the possession of Mr. Woodhouse?—Mr. Reichardt saw the collection of coins in that year, and he saw the collection up to a much later date than General Yorke Moore speaks of, but he never saw the antiquities.

279. When you were at Corfu, did you not hear that certain boxes had been removed from Mr. Woodhouse's house before his death?—Yes; there was a story to that effect, which I have gone into in this report, and which was based upon certain statements made by the Albanian in prison to Mr. Angelopulo, and, to a certain extent, confirmed by a Greek there, Zoï Miglio.

280. I want to know what it is that enables you to say that a large portion of this collection, belonging to Mr. Woodhouse, was not sent home at the time of his death?—I suppose that the Woodhouse Collection consisted of certain objects, which objects were not sent home at the time of his death.

281. What evidence have you that those things were in his possession at the time of his death?—I have no positive evidence, and in my report I do not assert more than "it is believed."

282. The trustees (at p. 20, Correspondence) make a distinct charge against Mr. Saunders, that he did not send home the coins and other antiquities under the bequest of Mr. Woodhouse to the British Museum; certain things were sent home; what proof is there that he did not send home all those things, except the things now in the possession of the heirs?—There is no proof, except the presumption that the Woodhouse Collection consisted of various other things which I have enumerated, and which I know no evidence to show were ever alienated by him, or taken away by him.

283. A grave charge is made by the British Museum against Mr. Saunders; is there anything but negative evidence of the fact of those things having been in the possession of Mr. Woodhouse?—Not much; I have mentioned General Yorke Moore's letter.

284. That was February or March 1865?—Yes.

285. Mr. Woodhouse died in February 1866?—Yes; that is just a year. Then the only other evidence which I can mention is the evidence of a person at Corfu, who states that a silver didrachm, which is an Athenian coin, and a gold ring, were purchased by Mr. Woodhouse about four months before he died; that is at page 127 of the Appendix; the evidence of Spiridion Zamboliotis, who says that he is by profession a broker: "About four months before Mr. Woodhouse's death, sold to him a silver didrachm of Athens, and a gold ring, subject, Neptune, incised on the gold; this figure was represented lying down, the hands raised on each side of his head, in one hand a trident. The ring was a heavy one." I am advised by Mr. Vaux that the silver didrachm has not been received among the silver coins received from Mr. Saunders, and I consequently enter it among my list of missing objects at page 100; an Athenian didrachm is a very rare coin; and with regard to the other object, the ring, I cannot find it, either among the rings which we have, or among the things which Mr. Woodhouse's heirs have.

286. Mr. *Layard*.] It appears that Mr. Reichardt was a great friend of Mr. Woodhouse; does he give evidence as to any of those objects being in his possession?—No; Mr. Reichardt never saw any of the objects which I mentioned to him as missing; he never saw the silver lamp, the bronze disk, or the plates; I do not think that Mr. Reichardt was at all acquainted with the antiquities. Mr. Reichardt says, at page 133 of the Appendix, with regard to what he saw after the demise, "Saw only one gold necklace; never saw in the collection the bronze plates now in the hands of Mr. Taylor, nor the silver lamp, or bronze plate engraved in Mustoxidi's work" (which I showed him); "saw a collection of terra cottas, a few modern bronze figures, one or two Greek painted fictile vases;" does not recollect seeing any brass helmets or brass swords. Again, he says, at page 134, "As Mr. Reichardt took greater interest in coins than in other antiquities, the only part of the collection which was shown to Mr. Woodhouse himself were the coins and necklace with cameos." I gather from that statement that the only part of the collection shown him by Mr. Woodhouse were the coins and the particular necklace, and I gather from that and his other observations, that he knew very little about the antiquities in one way or other.

287. Is that Mr. Reichardt's statement or yours?—It is Mr. Reichardt's statement.

288. It is signed by yourself?—It is headed "as made to the undersigned;" it was taken down in writing by me, and then submitted to Mr. Reichardt for correction.

289. Mr. *Egerton*.] At page 127, Spiridion Zamboliotis says, that four months before Mr. Woodhouse's death he sold him a ring belonging to Spiridion Boletzi?—So that man stated to me.

290. If you turn to page 161 in the Appendix, you see "One month before his death he bought a gold ring, for which he gave 40 dollars, which the Signora Maria took;" what is there to show that both those rings were not in the custody of the Signora Maria?—I cannot say; they may be the same ring for what I know.

291. It is described here as "a ring which the Signora Maria took"?—That was stated by Genevra Ceccoli; I did not recognise any such ring in the possession of the Signora Maria.

292. Do you know whether the missing coin was bought at the same time as the ring mentioned here?—It is so stated by the person who stated that he sold it. I know nothing more than what is stated at page 127.

293. Your evidence is, that with the exception of General Moore and this one person who sold this ring, you know of no positive direct evidence of those missing objects not accounted for, having been seen in Mr. Woodhouse's collection just before his death?—It would require to go over the whole of the evidence, before I could answer that question. I have not insisted in my report upon that point, but I think there are statements of Salvatore Fanti with regard to a more recent possession than that; but it would require me to look through the evidence before I could answer the question. Salvatore Fanti's evidence is given at page 71 of the Appendix.

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294. We have it in your report, that Salvatore Fanti left Mr. Woodhouse's service some six months before his death?—So I was told.

295. Then he could not speak to anything that took place six months before his death?—He could only speak to within six months. That there is Signora Maria Costantini's evidence at page 84, in the Appendix. Maria Costantini says, "Remembers the bronze figure from Cassope, described by S. Fanti; saw this figure in the drawing-room when she locked the doors of the apartments, on Mr. Woodhouse becoming ill. He was ill about eighteen days. A little before Mr. Woodhouse's death, the Signora saw in his hands a necklace all gold, different from the one sent to the British Museum."

296. There were a number of those coins found in the possession of Signora Maria, were there not?—Turning to my report, at page 46 of the Appendix, you will find that I state, "With reference to the coins in a stocking, said to have been seen by Mr. Angelopulo in the house, Maria Costantini produced a miscellaneous lot, about 100 in number. These, she said, were what Mr. Angelopulo had seen in a stocking, and declared that they had been given to her by Mr. Woodhouse at different times, when he picked out duplicates or worthless coins from his collection. Mr. Newton examined these coins; about 20 of them were ancient Greek, in bad condition and of no value. The remainder were modern, of various countries. Maria Costantini begged Mr. Newton to take these for the British Museum if he wished, but they did not appear to him to be worth accepting. Mr. Angelopulo, on looking at them, told Mr. Newton that what he had seen in the stocking were more in number; he should think from 300 to 400, and, so far as he could judge, antique." That is all I know about those coins, except Mr. Angelopulo's statement, as given by Mr. Valaoriti, which is printed at page 44, "That on the day when the Albanian robbed her, Mr. Angelopulo was called into her house to seize the thief; that Maria Costantini then stated to him that she had been robbed of 50 gold coins of Philip of Macedon; that she could not honestly have come by so many ancient gold coins; and that Mr. Angelopulo noticed in her house on that occasion a stocking full of ancient coins which, as she alleged, had been given her by Mr. Woodhouse in his lifetime." Then I saw Mr. Angelopulo, and he certainly repeated that story to me.

297. The fact remains that a certain number of those coins were found in Maria Costantini's possession?—The number found in her possession when I was present at the search as described in page 46 of the Appendix; that is all I know about the truth of the story.

298. There may have been any number of other things in the house; did you search the house from top to bottom?—Yes; the house was searched most thoroughly, and also his country house; even the wells were dragged; I was present at the search.

299. This person's house had been robbed not long before by the Albanian?—Yes.

300. Mr. *Layard.*] Have you any reason to believe that things were taken away from the house by anyone after the consul general had taken possession of it, and put the seals upon the doors?—I really know nothing as to that, except from the statements of Mr. Saunders and Mr. Taylor, that they were satisfied that the property from the day that the seals were put on was i
security; then it appears that certain object
were taken to the Consulate with the consent o
Mr. Taylor; that comes out in the evidence o
Mr. Saunders and Mr. Taylor.

301. Is there no charge against Mr. Saunder
of any neglect in the matter of custody betwee
the time that the seals were put on and th
time that the seals were taken off?—I conside
that to put the seals on, and to break them after-
wards, and all that time to have no record o
what was originally found, is want of prope
custody; I should not have been satisfied wit
that.

302. You have no reason to believe that any-
thing was removed surreptitiously from the hous
after the seals were put on?—I have no evi-
dence upon the subject, except what I have give
in this report. Certain persons came to me an
made statements as to having seen Mr. Taylor g
in and out by himself, and as to having seen Mr
Taylor and Mr. Saunders coming out of th
house by themselves, and I thought it my dut
to make a note of those statements; but I hav
never done anything more than note the fact tha
those persons have made those statements. In th
24 points with which I conclude my report,
state, at No. 21, "The statement made by Mr
Saunders as to the custody of the house after th
demise does not agree with the evidence of th
police, in reference to Mr. Taylor's visits to th
house alone"; and I also state, at page 67, No. 7
"The statements of Mr. Saunders and Mr. Ar-
cadino in respect to what they found in th
house, and what they took away, are at varianc
in material points with the testimony of othe
witnesses." I do not say which statement i
true.

303. What does that statement mean; does i
mean that, according to certain evidence give
to you, things which were in the house when th
seals were put on, were not found in the hous
when the seals were taken off?—It does no
mean that.

304. What does it mean?—What was foun
in the house when the seals were put on I can-
not say, because I have no evidence before m
to prove that; it simply means what it says, tha
Mr. Saunders and Mr. Arcadino state that the
found in the house certain things, and they too
them away, and that certain other witnesses
whose statements I give, differ from them i
material points. I assert no more than that
Everybody can satisfy themselves on comparin
the two statements.

305. Will you state to the Committee wher
that evidence is printed?—That evidence is ana-
lysed generally from page 12 to page 20 of th
Appendix. I have there presented an analysi
of it, as far as I could. Then the special state-
ments which I compare and comment on are
Mr. Taylor's statement at page 140 of the Ap-
pendix, Mr. Saunders' statement before Mr
Erskine, at page 149 of the Appendix, Mr. An-
tonio Arcadino's statement, at page 154 of th
Appendix, and the statement of Mr. Whitfield
who accompanied them, at page 157 of the Ap-
pendix. My object was to draw attention to th
fact that there were those statements made t
me. I did not profess to insist upon them, be-
cause they were not taken as regular deposi-
tions.

306. Am I right in assuming that the impres-
sion left upon your mind was, that somethin
had

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ad occurred between the time that the seals vere put on, and the time the seals were taken ff, and that persons had access to the house who ught not to have had access to it?—I thought that f it was true, as stated to me, that Mr. Taylor had onstantly visited the house alone, whereas Mr. Saunders says, in his evidence that the keys were lways in his possession, that was a discrepancy hat required clearing up.

307. You state in your report, at page 73 of he Correspondence, that these gentlemen (that s, the heirs) " state that on being put in posses ion of the house and effects by Mr. Saunders, hey found the cabinets and boxes broken open nd ransacked, though the keys of these cabinets, listinguished by their several labels, were lying eside them; that silver dishes, manuscripts, nd other objects belonging to the museum, were ying about in disorder in the apartments; that he whole museum had been turned over and its rrangements disturbed; that on entering the ooms, they commenced making an inventory of he several objects in them; that Mr. Taylor equested them to defer doing this till Maria Costantini had cleared out her own property; nd that they subsequently made an inventory f all the antiquities as they packed them " ?—Yes.

308. Do you know when the house was found n this state?—When they were first put in possession, according to their statement.

309. When was that?—After they had recognised the donation, and after they had received from Mr. Saunders a decree putting them in possession.

310. Some time had elapsed between taking off the seals and this entry by the heirs?—No; I conceive not. I understood them to say that that confusion they noted when they were first put in possession, the seals being broken, and the guards withdrawn.

311. At that time Mr. Saunders, you presume, had removed that part of the collection which he sent to the British Museum?—Yes, the ship sailed on the 20th, and the heirs were put in possession after that.

312. When you called upon me at the Foreign Office, in consequence of the office having sent to the Trustees of the British Museum a copy of the letter received from Mr. Saunders, did you bring me Mr. Saunders' letter to you, the one of the same date which is at page 63?—I cannot say at this distance of time whether I did or not, but I should think most probably I did.

313. I suppose you had seen a copy of the letter which the Foreign Office sent to the Trustees?—I think so, but I could not speak positively.

314. Did not it strike you that there was a discrepancy between the two letters; for instance, in the one to you, he says, " I have secured the donation of his coins and other valuables for the national collection," and in the letter to the Foreign Office, he merely says, " an extensive series of coins, together with some valuable antiquities"?—No, because my knowledge of the antiquities then was very slight; all I could affirm of them was that I had seen some valuable antiquities.

315. At page 135 of the Appendix, there is a letter to you from Mr. Woodhouse, in which I find this rather peculiar expression; he says, " This lamp, I will take care, shall be put up with my coins, &c., when sent to British Museum." Did not that phrase lead you to infer that he only meant to give the coins and nothing else?—No, certainly not; the word " &c." I considered covered anything else which he chose to give. I knew the bent of Mr. Woodhouse's mind; he attached far greater importance to the coins than to the antiquities, because he was a numismatist; I, on the contrary, being keeper of the Greek and Roman antiquities, attach far greater importance to the antiquities, because they appeared to me more curious than the coins.

316. In his will he talks about having been employed in numismatic researches, and therefore he gives his coins and other antiquities to the British Museum; he says, " And furthermore I declare, that having been engaged in numismatic pursuits during a long residence in these islands, and being desirous that the collection of coins and other antiquities so formed should be dedicated to national purposes: " if you construe that phrase grammatically, you would suppose that the things included in numismatic researches would be coins and other things connected with coins, would you not?—I do not see, because he states that he had been engaged in numismatic pursuits, which he certainly was making his study, that that warrants the inference that he does not intend to give the remainder of his antiquities; it rather indicates in his mind the relative value of the two; that he thought the coins as matter of history, about which he had particularly occupied himself, were far more important things, and I gathered as much from my interview with him in 1863. I, on the contrary, was particularly interested in the antiquities.

317. When you came to me at the Foreign Office, you only had before you the letter of which a copy had been sent to the Trustees, and the private letter to you; you had no information as regards the heirs or any other persons who might have rival claims?—No.

318. Therefore, the opinion I gave was merely founded upon the statement which you made to me, and upon Mr. Saunders' letter, stating that this collection had been left to the nation?—Yes, I put the question to you by the authority of Mr. Panizzi. It appeared to me to be a political question; whether Consul-General Saunders's influence on the spot was sufficient to manage all this without any difficulty, and whether any supposed difficulty would be increased or diminished by my going out.

319. At page 102 of the Appendix, there is a letter from yourself, in which you give an account of certain objects which Mr. Woodhouse showed you, and you end by saying, " All these objects he told me several times he intends to bequeath to the British Museum:" are you certain that those objects, which include several things missing, and some in the hands now of Mr. Taylor and others, were amongst those which he expressed his intention to give to the British Museum?—Quite certain; I put that down at the time as the only thing I could do to place the interview on record.

320. Mr. *Beresford Hope.*] Did it strike you from visiting Mr. Woodhouse's abode that proper care had been taken of his articles or the contrary?—When I saw Mr. Woodhouse's abode, it was entirely cleared out; it was an empty house, and I could give no opinion from seeing his abode as to whether proper care had been taken of his things or not.

321. By cleared you mean that the house was empty?

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empty?—The house was empty; the furniture gone, and everything; the heirs had removed their property.

322. The heirs had already removed their property when you saw it?—I arrived on the 28th of June; the heirs had removed their property about the 25th of March.

323. How came you to be informed of that other collection of marbles at Mr. Woodhouse's country residence?—Mr. Saunders informed me of it; I saw a number of marbles in Mr. Saunders's entrance hall, which he told me were part of Mr. Woodhouse's collection, which had been left behind till a convenient opportunity occurred of sending them to the heirs; Mr. Taylor informed me that there were others in his garden, and also others in the garden of Mr. Woodhouse which had not yet been removed.

324. But for that accident, you conceive you would never have become informed of the existence of them?—I had no means of knowing anything about them; certainly if I had had Mustoxidi's work "Delle Cose Corciresi," of which no copy existed in the British Museum at the time of the demise, I might have found, by looking through it, that he does refer to certain marbles as being in Mr. Woodhouse's collection.

325. You consider the "&c." in that letter of Mr. Woodhouse to you (page 135, Appendix) may be taken to mean his general museum?—I see no reason why it should not mean that.

326. And you suppose, if, as a numismatist, he thought his coins more valuable than his other things, it was not unreasonable for him to throw in an "&c." what he, however erroneousl thought less valuable?—I think he might pe fectly well have described his collection unde an "&c." in a note written without any part cular thought or weighing the words; I cann see anything in that inconsistent with his inter tion to leave the whole.

327. Do you think that the Decree of Proxeni the small silver lamp, and the disk with a figure c an athlete, having turned up unexpectedly in th possession of the heirs, shows that not much pai had been taken in investigating the collection —It is clear that no exhaustive search had bee made of what was in the house, or those objec must have been seen. Mr. Taylor, Mr. Re chardt, and Mr. Saunders all assured me th they were not seen, and consequently not hande over to the heirs. I naturally came over to t conclusion that they had been stolen.

328. No real exertion was taken to investigat what the collection was composed of?—I do n think there was sufficient exertion taken; bu that would of course depend upon what M Saunders' view of his duty was.

329. Mr. *Layard.*] The fact is, that certai things which Mr. Saunders had stated, and M Taylor had stated, were not in the collectio when Mr. Woodhouse died, have since turned u in the hands of the heirs in London?—Yes; th bronze disk, the Decree of Proxenia, and th silver lamp were in the collection.

330. Those things now in London, in the pos session of the heirs, were brought from the hous of Mr. Woodhouse?—Yes.

Tuesday, 30*th July* 1867.

MEMBERS PRESENT:

Mr. Cardwell.
Mr. Edward Egerton.
Mr. Beresford Hope.
Mr. Howes.
Mr. Layard.
Mr. Lowe.
Mr. Arthur Russell.

THE RIGHT HONOURABLE EDWARD CARDWELL, IN THE CHAIR.

JAMES WOODHOUSE, Esq., called in; and Examined.

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331. Mr. *Lowe.*] YOU are Nephew of the late Mr. Woodhouse of Corfu?—Yes.

332. You and your sister, Mrs. Puddick, are his nearest relations?—Yes.

333. By whom were you first apprised of your uncle's death?—By Mr. Taylor.

334. When?—I do not know whether I can tell you the date.

335. Do you remember when you first received a copy of the instrument under which the British Museum claimed a certain portion of your uncle's property?—I do not recollect the date.

336. You, and your brother-in-law, went to Corfu in consequence?—Yes.

337. Do you remember when you arrived there?—I think the 27th; I do not recollect the date precisely.

338. You wrote a letter to Mr. Saunders when you arrived?—Yes.

339. Which is to be found at page 77 of the correspondence?—Yes.

340. And you received the letter from him which is at page 5 of the correspondence?—Yes.

341. Then did you address to Mr. Saunders the petition which is in page 5 of the correspondence?—I think that is the petition we were made to send in.

342. You say which you were made to send in; will you state what you mean by that?—We consider that we were compelled by the consul general to write it.

343. How do you mean compelled?—We could not get possession of the property left until we sent it in.

344. Did he refuse you possession?—Positively.

345. Will you state what passed?—The greater portion was in Italian, which I did not understand; I only caught the English at times. Sir George Mercoran was there, and he spoke Italian, and only Italian, I believe; so that I did not hear the whole of the conversation.

346. Who was Sir George Mercoran?—He was our adviser.

347. What was the force put upon you to sign the petition; you say that the goods were not to be given over to you until you had signed the petition?—The goods would not be given over; that we should have to go to London for a bit of parchment.

348. It was not any question of your right, but merely of some legal formality?—We must sign a letter, giving up the things he had sent to the British Museum, and until we had done that we could not get possession.

349. And you signed it under that compulsion?—Under that compulsion.

350. *Chairman.*] Who put that compulsion upon you?—The consul general.

351. Personally?—Personally; you must understand that a great deal of this was in Italian, and translated to me; it was only the English portion that I could understand.

352. Mr. *Lowe.*] You heard enough in English to know that what you state is correct?—Yes.

353. *Chairman.*] You say that the consul general did it personally?—We went to the consulate with Sir George Mercoran and Dr. Peirie.

354. Who told you that you could not get the goods unless you signed the document?—A portion was translated at the time by my brother-in-law.

355. Who told you that, without signing the document, you would not get possession of your property?—I must consider that the consul general told me so.

356. Did he?—Well, the great portion was in Italian.

357. Mr. *Lowe.*] Your brother-in-law understands Italian?—Yes.

358. Mr. *Beresford Hope.*] Who were present at the time, and who translated the conversation to you?—The person who translated the conversation was my brother-in-law.

359. Who were present?—The consul general was present, Sir George Mercoran, Mr. Peirie, and Mr. Taylor, I think: we were there several times.

360. Mr. *Layard.*] When you say "under compulsion" do you mean that you were told that in order to arrange matters amicably, you had better give up that part of the collection; or were you told that unless you gave up that part of the collection you would get nothing at all?—No, that we should have to send to London for a bit of parchment; at all events, kept out of the property, and perhaps never get any of it; that if we signed this renunciation, he would take our mere passports of identity, but if we would not, he would put every stoppage in the way of proving our identity, which was already proved.

361. Was this arrangement offered to you rather as an amicable arrangement than anything else?—No, rather as a threat.

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362. Were you told that you must give up that part of the collection, or you would have none?—That he had the power to keep us out of what was left unless we signed this renunciation, and we appealed to our lawyers, and they said, "Sign it under compulsion; you must do it, and you can appeal against it in England."

363. Did you sign any protest at that time against being compelled to give up that part of the collection?—No.

364. Did you make any verbal protest?—No.

365. Mr. *Lowe.*] How long was this after your arrival?—I think we went up the first day.

366. Did you sign that document on the first day of your arrival?—No, I think it was two or three days after.

367. Mr. *Beresford Hope.*] When did you arrive?—On the 27th, I think.

368. Mr. *Lowe.*] After signing your petition, what happened?—They then gave us possession. I should not have signed that petition even with those threats, but that we were allowed to go over the premises to inspect them, not to have possession, and from what I saw I knew that if we did not sign at once nothing would be left; at least that was my conviction. After refusing to sign this, we were allowed to go over the premises, to view the premises, and from the state of those premises I signed at once; I would have signed anything.

369. *Chairman.*] Will you mention what the state of the premises was?—They looked as if an enemy had been sacking the town: papers were left all over the rooms, books, manuscripts, silver dishes on chairs, chairs on tables; a cabinet was on the floor, and everything was broken open. The keys belonging to most of them were on the table with labels to them, and in many instances duplicates.

370. You mean of the cabinets that had been broken open?—Boxes, tea-caddies, tea-chests, and everything.

371. Do you mean that although there were keys, the cabinets had nevertheless been broken open?—In the case of the cabinet it was forced open. I have the key now, and use the key to it.

372. The key was there at the time?—Yes; when we arrived, I think it was in the door.

373. Mr. *Egerton.*] Do you mean that the key was put in after the lock was forced?—It might have been found afterwards, and then put in the lock.

374. Mr. *Lowe.*] This state of things induced you to sign the document?—I would have signed anything to get possession. My firm belief was that as I had heard Mr. Saunders had one key, and Mr. Taylor the other, and that they paid constant visits there, and perhaps left the doors open, we should get nothing; besides I had been told that the doors were sealed; we had been told by letter that we need not hurry, and that nobody could touch the things; there was no seal on the doors. Mr. Taylor had one key and Mr. Saunders had the other key.

375. Was there no seal on anything?—I do not think there was a seal on anything.

376. Not on the inside or outside doors, nor on the cabinets?—Not on any of them.

377. Mr. *Egerton.*] Are you quite sure about that fact?—I must be sure, for I was on the stairs when Mr. Taylor opened the doors, and I should have seen any breaking open.

378. Can you state positively that there were no seals on the doors?—Yes, I think I can speak positively, and I think I will be corroborated by my brother-in-law.

379. Mr. *Lowe.*] Did you ask whether Mr. Woodhouse had any inventory of his collection?—Yes, I heard on all sides he had one.

380. Did you ask Mr. Saunders whether he had or not?—I think we did.

381. Was any one produced?—No, none at all.

382. Who informed you that he had an inventory?—All the servants, and Signora Costantini said he was always busy with his catalogue; so his servant said; that he was always improving it. It might not have been a catalogue, but a list of everything he bought. He was a very precise man indeed, and he would not, I am sure, be without a list.

383. You took possession of those things?—Yes.

384. Did you make a catalogue yourself?—We made a list of the things.

385. How long did it take you to make it?—We listed as we went on packing; we found that we had better list and pack together.

386. You made a complete list in two days, did you not?—No, I think we were two or three weeks; I did the principal part of the packing. I worked from 10 o'clock in the morning until dusk.

387. Did you receive other valuables not connected with this collection from Mr. Saunders; silver dishes or money that he had at the consulate?—Yes, we received four silver dishes.

388. Was there any inventory of those things; were they under seal?—They were at the consulate.

389. When were they delivered to you?—We received them in a small iron safe after we left and came back to England.

390. Did you see them while you were at Corfu?—No.

391. *Chairman.*] How was that?—I forget who spoke about them first; we knew that they were at the consulate, and they were not given to us with the other things; they got forgotten, until we had nearly started; in fact, all the packing was done; one of the things was the little statuette of Bacchus.

392. Mr. *Lowe.*] Did you leave that by mistake?—No, we did not leave it by mistake; it was at the consulate.

393. Was it sent with the other things?—It was sent down to the hotel, but sent very late; it was too valuable to carry about in a portmanteau, and we left it to be packed with the silver dishes, in the iron safe.

394. When did you first know that any antiquities or coins had been sent to the British Museum?—I knew before I left London that they were ordered to be sent. I heard in London that a Queen's ship had been asked for, and had been sent out to fetch them.

395. The petition which you signed, only speaks of coins; how comes it not to mention antiquities?—Because we objected to the term antiquities in the will more than to "coins," in fact, and we were told by Mr. Saunders that he had put in those words; in fact we were told openly by all, that Mr. Saunders had put in those words to carry the necklace.

396. You were aware at the time you signed that document, that some antiquities, besides coins,

had been sent?—Yes; that is why we would not sign to the term "antiquities."

397. You wanted to reserve your rights as to antiquities?—Yes.

398. How did you first know that besides coins some antiquities had been sent to the British Museum?—We saw it in the document.

399. What document?—In the copy of my uncle's will.

400. The will is one thing, and what people did under the will is another thing; who told you that the construction that had been put upon the will, that is, that it included certain antiquities, besides coins, had been acted on?—We were told by Mr. Saunders that he had put in those words, as we understood, to cover the necklace, which necklace he had sent.

401. Did he mention other things besides the necklace?—No; I only knew that other things had gone, when I took up the list from Mr. Taylor's table and saw other things mentioned, the day before I left Corfu.

402. When you signed the petition you did not know that anything had been sent besides the coins and the necklace?—We did not.

403. Was the inventory that was sent, exhibited to you?—We saw it twice; it was merely shown to us; a copy was promised us by Mr. Taylor the day before we started; I saw it, and saw for the first time that there was more than one antiquity sent.

404. When was that inventory first shown you?—I cannot say.

405. Was it before or after you signed the petition?—I should say afterwards.

406. Mr. Saunders has stated that you expressed your full and entire satisfaction with him, and that you presented him with a ring as a proof of it; is that so?—No, it is not so; I presented him with a ring because I was importuned for this ring by Mr. Taylor, who told me that Mr. Saunders among the rings had seen one ring which he admired or wished for. At the time this was told me, I had the notion that as he coveted this ring, and had not taken it, that therefore of necessity he had taken nothing whatever belonging to me; I consider that if he saw a ring which he coveted and waited for me to give it him, it was a sort of proof that all the things were safe. I gave it him because I was importuned to give it him.

407. It is not true that you presented the ring to Mr. Saunders as a testimony of your approbation of his conduct in the matter?—No; I considered that I was obliged to give it to him, and I would have given him 50.

408. Did you, on the whole, approve of his conduct?—Certainly not.

409. Do you complain of anything else in his conduct besides what you have stated?—I complain of his entire conduct to me while at Corfu; I consider that he was placed there for the protection of British subjects, and I consider that I have been robbed by him.

410. Mr. *Russell.*] What made you think that you were obliged to give the ring to Mr. Saunders?—We were never safe in that island until we were clean out.

411. Mr. *Lowe.*] You allowed Mr. Newton to compare his list with the articles you have in your possession?—Yes; I understood that Mr. Newton wished to see them.

412. He identified certain objects in your possession as being things described in his list?—He thought so; he was not quite clear about many of them.

413. Mr. Newton states that you have received hardly any objects in gold; is that true?—Very few indeed.

414. Mr. *Layard.*] Did you receive any?—There is a modern gold chain, but that is not what Mr. Newton alludes to; he refers to antiquities.

415. Did you receive any gold necklace or earrings?—One earring, and part of another.

416. Mr. *Lowe.*] Do you think that any objects were missing from Mr. Woodhouse's collection that were there at the time of his death?—We were told of the Bacchus before it was restored to us; we were told of the Bacchus first by Signora Maria Costantini, or one of the servants.

417. Where was the Bacchus?—The Bacchus was at the consulate, I believe; we asked for it in consequence of information. A clock was placed instead of it on the mantel-piece.

418. Do you remember finding a strong box among Mr. Woodhouse's things?—It was taken away. There were two cases, I believe; they were both gone.

419. There was one in which the things were sent to the British Museum; was there another?—We have received a small one since.

420. Mr. *Layard.*] Did you, when you were at Corfu, see the one you have received since?—No; I saw the larger one.

421. Where was the box which you have received since?—At the consulate.

422. By whom was the second box sent to you?—By Mr. Taylor.

423. Mr. *Egerton.*] Do you know the handwriting of your brother-in-law, Mr. Puddick?—Yes.

424. Is that his handwriting (*handing a letter to the Witness*)?—I have no doubt of it.

425. You know this to be his writing?—Yes.

426. Look at the other side of that letter; there is a receipt of the things which you and he received from Mr. Saunders; will you read the letter?—"13th August 1866. Dear sir,—Yours of the 23rd July found me ill in bed, unable to write or attend to business. There has been no inventory taken of the effects we received at Corfu; part only of the cases are yet opened. I furnish you a receipt on the other side of the principal things received from you, to the best of my memory. What can Mr. Newton mean by laying hands on the property belonging to us? We have made no application to the Trustees of the Museum. This strange conduct of his opens the whole question. Mr. Taylor is in London, but in consequence of my severe illness, I have not yet seen him. Yours truly, J. E. Puddick.—Received of S. S. Saunders, Esq., 2 April 1866, the following effects of the late James Woodhouse, Esq., of Corfu. An iron chest and tin box, containing four silver (or plated) side-dishes; a mediæval marble statuette of Bacchus; 14 pieces of ear-rings; 144 engraved rings; platina snuff-box; emerald and gold ring; small silver snuff-box; small scales and weights; 11 pieces of bronze; Mr. Woodhouse's gold medal; crystal casket, seal, and watch key (combined); 12 engraved stones, &c. &c.—J. E. Puddick, for J. Woodhouse and self."

427. You told us just now, that you only received one earring, and part of another?—Some bits.

428. Whereas in that letter, it speaks of 14

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pieces?—That is 14 pieces, some as big as a pin's head.

429. You mean only one entire one?—I do not know that there was even one entire; nearly entire.

430. When had you seen this collection before?—I had never seen it before.

431. Had you any intimation that your uncle was likely to leave it to you?—Yes.

432. From what?—From my uncle's last letter, inquiring for the age and names of my children.

433. Was he in the habit of corresponding with you?—Not much; he was not a good correspondent with anybody. This is his last letter to me; "Corfu, 9th January 1866. Dear Nephew,—The enclosed bill of lading is for a small box, containing two views in this fine island, and a photograph of the beautiful scenery in the Bosphorus, which I enjoyed for a month in the year 1824, during the Greek insurrectionary war. Although I formerly inquired of you particularly, respecting your moiety of your mother's property, you never informed me how that was disposed of after her death. Also let me know fully the cause of your dissatisfaction with Mr. Hunter, mentioned by Mr. Taylor on his return from England. I suppose your family is numerous; let me know exactly their names and ages; and above all, is their religious instruction duly attended to. Yours truly, J. Woodhouse."

434. Mr. *Layard.*] Why did you infer from that letter that he was going to leave you his antiquities?—He had always promised them; he occasionally spoke about his coins going to the British Museum, but all my life we had this promise, that his property should come to us.

435. Mr. *Egerton.*] How often have you seen him in the course of your life?—Not above three times, and on each time I saw him he made the promise.

436. On each of those three times did he tell you that he was going to leave you his property?—He told my mother so; my mother, or one of us.

437. Mr. *Layard.*] Did he tell you personally?—In one instance, at least, when we were together, he did.

438. Did he merely say "property," or did he specify any collection of antiquities?—He spoke of it as his property.

439. Mr. *Egerton.*] Did he say anything about leaving to the British Museum his property?—Once, at all events, he mentioned to my mother in writing that the coins should go to the British Museum.

440. From whom did you first hear of his having left those things to the British Museum?—We heard from Mr. Taylor.

441. By letter?—Yes.

442. Mr. *Lowe.*] I understand that you wish to correct something which you said about the strong box?—I understood the question I was asked about a strong box, and I thought the question alluded to an iron safe, which I have received in England since; but probably the question referred to the strong box mentioned in the correspondence, the wooden box lined with tin. If so, that is another case; I can give the measurement of that, as I have it in my house.

443. Have you another strong box?—There is another; one of the two mentioned in this evidence, which I brought to England full of things; that was the box found in the kitchen.

444. Is that lined with tin?—Yes.

445. Was it a new one?—It had never been used.

446. What were the dimensions of it?—Outside 41 + 24 + 18.

447. Mr. *Egerton.*] You have given a description of the state of the premises when you first visited them; what was the exact interval between the time of your uncle's death and the time of your visit?—About a month.

448. Had you had any letter from Mr. Saunders during that month?—Yes, we had had one letter, and a copy of the legal instrument.

449. Have you that letter here?—I believe it is here; it is printed at page 5 of the correspondence.

450. You stated that you found the things lying on the floor, and the cabinets all ransacked, and you could not say whether there was any key to the outer door?—I said that the outer door was not sealed.

451. To whom did you make application to get into the house?—Mr. Taylor applied for it; it was Mr. Taylor who proposed, I think, that we should see it.

452. Did you, upon your arrival at Corfu, go to Mr. Saunders?—I think we saw him the same day; we went up the same day, I think.

453. Who told you that Mr. Taylor and Mr. Saunders had both keys?—Mr. Taylor himself.

454. Did not it occur to you upon hearing that both Mr. Taylor and Mr. Saunders had keys, to send to Mr. Saunders for the keys?—No.

455. Why?—Because I conceived it would be of no use; I had heard so much about this Woodhouse affair at Corfu.

456. Who had you heard so much about the Woodhouse affair from?—So many people, that I could not mention; there were the servants talking over the place.

457. I asked you whether, upon your first arrival at Corfu, you did not put yourself in communication with Mr. Saunders?—I think we did, the same day.

458. You had not had a great deal of communication with other people before you wrote to Mr. Saunders?—No.

459. Then why did not you write to him at once for the key?—I think we applied for possession at once; I think it is in the correspondence.

460. Is this the letter at page 77: "Having had the honour of an interview, and satisfied you of our identity, we are ready to make the customary affidavits as to our being the only next of kin, and therefore request you to be good enough to afford us the necessary facilities for realising the effects of the late Mr. James Woodhouse?"—That is the letter; then we had been refused, I take it.

461. Does that appear?—No, I do not know that it does; but I am persuaded that we had been to the consul general, and been put off.

462. Had you made an application, or not?—I believe we had; this letter was written in consequence of what passed at the consulate, and our being told that we must make a petition.

463. It is material to tell us the exact circumstances of the case; you say this letter was written in consequence of a previous refusal by Mr. Saunders?—I believe it was.

464. Are you certain of that?—I will not say I am

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I am certain that there was a positive refusal, but difficulties were placed in our way.

465. Did you make a direct application?—We waited upon the consul to be put in possession; we saw Mr. Taylor, who directed us to go to the consulate.

466. You saw Mr. Saunders?—Yes.

467. What did you say to him?—I cannot recollect the words.

468. You charge Mr. Saunders with having neglected his duty; I want to know what passed between you?—I conclude that we asked to be put in possession of our property.

469. Where did you see him?—At the consulate.

470. Did you go the same day you arrived at Corfu?—The same day, I am pretty sure.

471. At what time?—About one or two o'clock; we must have arrived at Corfu about eight or nine.

472. And you went at once to the consulate?—Yes, I do not know whether we first went to Sir George Mercoran, and different people or went first to the consulate; we saw Mr. Taylor; he came and met us.

473. Was that by appointment?—No, he knew the time we would arrive.

474. You persist in stating, after having time to recollect, that Mr. Saunders refused in the first instance to give you any facilities in going in?—I do not say that in the first instance we were refused; he said we must follow certain forms, and by degrees we got at what we were to do.

475. Was this letter written the same day that he refused?—No, I do not think so.

476. How far is your uncle's house from the consulate?—Some distance from the consulate; it was only a few doors from our hotel.

477. When was the letter written; at what distance from the time when, as you state, Mr. Saunders refused?—I should have thought the next day, or the day after, according to my memory.

478. How long after the letter was it that you were allowed to see your uncle's house?—I should think another two days or three days; two or three days after writing that letter, because there we were ordered to write this petition, and we made demur about it, especially myself; and after it was written I still refused to sign it, which caused further delay, but having seen the inside of my uncle's house, I at once agreed to sign it.

479. I understand you to say you saw the house after the petition had been written; before you had signed it?—Yes.

480. Was the petition in your handwriting?—Yes, copied from my brother-in-law's; I think so.

481. Who went with you to your uncle's house?—My brother-in-law, Mr. Taylor, and I think Mr. Arcadino, but I did not know his name; I think it was the chancellier of the consulate; some gentlemen at the consulate.

492. You stated that you found everything in the greatest confusion?—Yes.

483. Had you before that seen any of those different articles, or had them described to you?—No.

484. Had you had conversations with your uncle about the different things he had in his collection?—No.

485. Had any of the things been removed before your visit?—Evidently; we heard that things were removed up to the consulate.

486. Did you see any of those things at the consulate?—Only those that were returned to us.

487. Were those anything beyond what is mentioned in that paper which you have just read?—No, but I think that paper has mixed them up; some of those we received afterwards in a box; for instance, the "Bacchus" we received in London afterwards; we received it from the consulate, but we did not receive it while there; we did not bring it away with us; it was sent to our hotel.

488. Did you have any conversations with Mr. Saunders about the part he had taken in this transaction?—Yes, there was a great deal of conversation; I had a little myself; but my brother-in-law was the principal person who spoke; Sir George Mercoran, who had formerly been a judge, was there, and the counsel; there was a very great deal of conversation, but it was principally in Italian; it was a very stormy meeting; I did not understand a word of it.

489. Who was the conversation between?—Mr. Saunders, Sir George Mercoran, Mr. Peirie, and Mr. Puddick.

490. Did Mr. Puddick speak Italian?—Yes.

491. Mr. *Beresford Hope*.] Who is Mr. Peirie?—A counsel, who was recommended by Sir George Mercoran.

492. Mr. *Egerton*.] Who is Sir George Mercoran?—He had been supreme judge for 20 years.

493. Did you put yourself in communication with Sir George Mercoran?—Yes.

494. In consequence of some letter you took from England?—Yes.

495. Mr. *Layard*.] When you left England, had you any idea that any part of Mr. Woodhouse's collections had been sent to the British Museum?—No, I knew that a ship had been sent out for them.

496. How did you obtain that information?—I was told by a friend.

497. By whom?—I would rather not mention his name, he told me not to mention it; but that the orders for the ship had been sent.

498. To Corfu, to carry away part of your uncle's collections for the British Museum?—Yes.

499. Before you left England, did you apply to the British Museum?—No; I mentioned the fact to a friend of mine, and my friend mentioned it to a counsel, who said that would be of no consequence; that they would bring them over; that there would be no difficulty, for they were certainly ours.

500. Had you at that time a copy of the testamentary memorandum of Mr. Woodhouse?—Yes.

501. It had been sent home to you?—Yes.

502. When you got to Corfu, what was your first step?—We should have gone straight to the hotel recommended to us, but we were met by Mr. Taylor near the port, who took us to his hotel, a hotel he has some interest in; it is generally spoken of as his.

503. Mr. Taylor was aware of your coming by that particular boat?—He must have known that, because I sent a telegram on the Sunday, which was the 17th, I think; I could not get away, and I could not reach Corfu until this identical boat.

504. After you got to the hotel, what was your next step with regard to this business; what did you do when you got to Corfu?—I forget the first thing, but I think the first thing was Mr.

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Taylor showed us those plates which he said my uncle had given him, and took us to his (Mr. Taylor's) house to show us those bronze plates and afterwards he took me to the garden to show me the marbles and things.

505. When did you first go to the Consul General?—I forget; but I am persuaded that we went the first day, in the middle of the day.

506. What happened on the occasion of your first interview with the Consul General?—It was represented to us the form that we must make application in; I believe it was said that we must make it by petition.

507. When you went to the Consul General, for what purpose did you go there?—We should go there to get possession of my uncle's property.

508. Did you ask the Consul General whether there was any property to which you were entitled, and where that property was?—We knew that we were entitled to a portion of what was left, because we had received in London a letter from Mr. Taylor saying that furniture and different things and curiosities had been left to us.

509. Were you aware that Mr. Saunders, as Consul General, was by law authorised to take possession of the property of a person who had died without a will?—I take it that that would depend upon whether there was a domicile.

510. It was so, was it not?—I do not know; I fancy not.

511. Why did you go to Mr. Saunders?—Because Mr. Taylor told us to go.

512. For what purpose?—We required to get possession.

513. You knew that Mr. Saunders had taken possession of this property?—Yes.

514. What did you ask Mr. Saunders; did you ask him whether he had that property in his custody, or what questions did you put to him?—I do not remember.

515. After your interview with Mr. Saunders, you went to Mr. Woodhouse's house?—Yes, some days after.

516. Why did not you proceed at once to the house?—I concluded we could not have permission; we had a certain paper to sign which we objected to sign; a certain petition which we objected to

517. Were you informed that any persons had been to the house between the time the seals were said to have been put on, and your arrival?—I do not think we were.

518. You did not know whether people had access generally to the house?—I do not think we knew that they had, we only inferred so.

519. You did not know who scattered the contents about in the way in which you have described; you had no knowledge of your own as to who had done it?—No.

520. You made use of rather a strong expression with regard to the Consul General; you said that you considered that you had been robbed by him; what did you mean by that expression?—I consider I may safely use the expression, with regard to things which he sent to the British Museum, at all events, which he ought not to have sent; he was informed that we were at Ancona, and he ought not to have sent those things.

521. You mean that he sent things to the British Museum, which, in your opinion, belonged to you?—Yes.

522. Not that he took for himself things that belonged to you?—That I cannot speak to of my own knowledge.

523. That is not your accusation?—I do not make the accusation.

524. It appears that there were certain things which Mr. Newton believed were in the collection of Mr. Woodhouse, which he did not find at Corfu, and which Mr. Saunders said, were not in the collection; those things have since I believe been found?—Some of them.

525. Who found those things?—Mr. Newton found them at our house.

526. Some things, I understand, which Mr. Newton did not see at Corfu, he found at your house?—Yes.

527. How did you get them?—I packed them up, and sent them home.

528. Where did you find them?—In the different rooms.

529. When you went to the house some of those objects were still in the rooms?—Yes.

530. At that time the rooms were not under seal?—No.

531. Have you an inventory of the antiquities which have been handed over to you?—A rough memorandum which we made at the time while we were packing; it is not very readable, still I could name everything I brought away; there were a very great number of things, and some of them not of value.

532. Mr. *Howes.*] When you went first to Mr. Woodhouse's house, did the Consul General go with you?—No.

533. Did any officer of his go with you?—Yes; I think the gentleman I take to be Mr. Arcadino.

534. You mentioned the state in which you saw the things in the rooms; were you at all aware what your uncle's habits were as to the custody of his own property, and the arrangement of his own property?—I have always understood that he was particularly precise and careful.

535. You mentioned that some objects were found at the consulate, or were produced from the consulate; did you suppose that they had been removed to the consulate before you went to Mr. Woodhouse's house?—Yes.

536. That is clear?—Yes, it is understood so, I believe; some time before we reached Corfu.

537. Did Mr. Saunders give you any account of how they came to the consulate?—No, I think not.

538. Mr. *Beresford Hope.*] You told us at the beginning of your evidence something about a list or catalogue that your uncle kept, have you any evidence to prove that he kept any such list or catalogue?—No, I do not think I have.

539. It is only on hearsay?—Many things were numbered as if there was a list belonging to them; but otherwise, it is only on hearsay.

540. You had such information on hearsay?—Yes, from several people; from the servants.

541. Your acquaintance with your uncle's general habits would lead you to think it probable that he made such a list?—Yes; if you saw the papers he left, you would know there never was such a precise man.

542. And a man fond of making memoranda?—Yes; except letter-writing, he was excessively fond of writing and copying.

543. He was a man who ticketed his different articles?—Yes.

544. You say you had no positive promise from him in writing during his lifetime, that the collection would be left to you?—I think there is a promise in writing made to my mother.

545. Not

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545. Not in your custody?—No, but I think it could be produced; it has never been in my custody.

546. Of course you would take the things, together with your sister, as his heir-at-law?—Yes.

547. In the course of his lifetime were any intimations made to you that more or less of the collection might go, not to you, but to the British Museum?—Yes; there were intimations that the coins might go, or a portion of the coins at all events.

548. Only coins?—Only coins.

549. Your impression then at the time of your uncle's death would be that the coins more or less would go to the British Museum, and the residue would go to you?—No; I understood distinctly that he had altered his mind about it; I heard from many people that he had altered his mind about leaving the coins to the British Museum. Some said that he intended to sell his collection, and probably leave us the money.

550. *Chairman.*] You said just now that you charged Mr. Saunders with having sent home to the British Museum articles which not only belonged to you, in your opinion, but which Mr. Saunders believed to belong to you; on what authority do you make that statement?—He understood he was acting illegally in taking possession of them; at least I was told so by the lawyer; the lawyer at Corfu, I understood, waited upon Mr. Saunders to tell him that he was acting illegally, and to beg him to wait until we got out, we being then at Ancona.

John Edward Puddick, Esq., called in; and Examined.

J. E. Puddick, Esq.

551. Mr. *Lowe.*] The last witness spoke to a conversation which was partly in Italian, and partly in English, which he could not follow; can you give us the purport of that conversation between Mr. Saunders and yourself, and some legal gentlemen?—There were two legal gentlemen, Sir George Mercoran and Dr. Pierie acting on our behalf. We had a meeting there to induce the consul to leave it an open question about the coins altogether, so that there would be no necessity in that case to give any petition; that was argued very warmly.

552. Who were present?—There were present Sir George Mercoran, Dr. Pierie, Mr. Taylor, Mr. Saunders, myself, my brother-in-law, and Mr. Arcidino, the chancellier of the consulate.

553. State what passed?—Sir George Mercoran expostulated with Mr. Saunders with regard to binding us to make any petition whatever, and said it was against the law; that the document was altogether invalid which Mr. Woodhouse had made, and he told Mr. Saunders that he did not know the law of the place, and that he should not act so. Mr. Saunders said at any rate he had his own duty to do to his own Government, and that he should take the responsibility of doing it; they got extremely warm in their conversation upon the subject, and when we retired Mr. Saunders said to me, "You understand this sort of thing, I dare say; I dare say you will understand what sort of petition should be presented;" (I objected to the word "petition" altogether), but he said that is the formal name of it, and he said, I think you will be able to draw out something satisfactory, and when we got out of the house, Sir George Mercoran immediately said, my advice to you is to sign anything you are asked, for you are coerced into it, and then repudiate it immediately afterwards; there is no impropriety or immorality in it; I tell you the law here, and I tell you on my own responsibility that that is the course which you ought to pursue.

554. What was the coercion which Mr. Saunders employed in order to get you to sign the petition?—We applied to the Probate Court here, and our solicitor told us that they could not give us probate; they told us that it was under a foreign jurisdiction, that we must go out there and do the best we could there. When we went there we found that our getting the sum of money in Mr. Taylor's hands, I think, about 1,800 *l.* altogether, and also the antiquities that remained, depended on our doing this; we understood if we had not done that we should have been sent back.

555. What did Mr. Saunders say exactly, and what was the coercion he used?—He said it was always usual for anyone who came out on such business to bring, he did not know exactly what, but a parchment; he knew that he had always had a parchment before.

556. A parchment, for what purpose?—To prove our identity, and one thing and another, the legal forms of those Courts. Then I explained that we could not be admitted in England to probate, and therefore we had nothing but the evidence that we were able to furnish of our identity, which satisfied him, but he still let me understand that unless we drew up this petition, acknowledging the legality of the bequest, he should send us back.

557. That is, would not admit you?—Yes.

558. But if you did sign the petition?—Then he would facilitate us in any way or shape.

559. Then you signed it, and he did admit you?—Yes. My brother-in-law (who is rather an invalid) made a mistake about the time that we arrived; it was the 24th, and not the 27th.

560. When did you sign that petition?—On the 24th. We did not go to Mr. Saunders immediately, but we went to several persons; we had our letters of introduction to various persons there, and having gone to those persons, my brother-in-law went to see Mr. Woodhouse's garden, and we saw Mr. Taylor, and we then arranged to go with Mr. Taylor to the consulate in the morning to ask to be admitted.

561. That same morning?—The next morning.

562. The 25th?—Yes. Mr. Saunders on the 25th intimated what would be necessary, as I have explained, but not so strongly on that morning, and on my return to the hotel I wrote a letter merely demanding to be allowed to be admitted to the succession. Though he had intimated that it would be necessary to give a petition, we did not enter into that, we merely formally demanded it, and then he answered our letter (the letters are here in the correspondence), and said that our petition would form a basis for future proceedings. Then when we were advised that if we got into the Greek courts we should be put to great expense, and when we saw the state of things as regarded the custody of the property, we thought we had better sign the petition, and get what we could, and come home.

563. Mr. *Egerton.*] How long was it after your arrival

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arrival that you had this conversation with Sir George Mercoran?—The long meeting which took place was before we sent in the petition. Sir George Mercoran proposed this meeting, to see if he could persuade the consul to leave it an open question.

564. A good deal was said about the local tribunals, was there not?—Yes; Sir George Mercoran thought that we had better not get into those local tribunals.

565. Did he tell you that it was a great question whether you were entitled to anything?—No; but that it would be such a long matter, and that we should have house rent to pay, and one thing and another, and the things being insecure, we should not get much eventually. One of the trustees was an extremely old lady, she being more than 70; I saw her and spoke to her several times, but she knew nothing about it; she was a nonentity.

566. Can you fix the exact time when you saw Mr. Saunders after your arrival?—On the 25th.

567. The day after your arrival?—Yes.

568. What exactly passed between you and Mr. Saunders?—Mr. Saunders told us that it was necessary for us to petition the consulate, in order to enter into possession; he did not very thoroughly explain himself, but he led me to understand that it would be necessary to petition.

569. Did he say why it was necessary for you to petition?—The conversation was rather guarded, but he led me to understand that such a petition would admit us to possession at once.

570. Did he say that he, as consul, was entitled to the custody of your uncle's effects?—I do not think he told us so.

571. Did he tell you in what character he was interfering in Mr. Woodhouse's affairs?—As an official.

572. Your brother-in-law has said that he met with considerable opposition from Mr. Saunders; will you state exactly what passed; did he throw every difficulty in the way of your going to your uncle's house?—He would not allow us to go to the house; we had written a letter asking for permission, and we were given to understand that till that petition went in we should not have the keys.

573. Can you tell us when that petition was written?—I cannot tell the day, but I should think three days or four days after our arrival; the date is on the petition.

574. It is March the 26th?—Yes.

575. You arrived on the 24th, and you saw Mr. Saunders for the first time on the 25th; the date of this is the 26th, the day after?—Yes.

576. Did you get to your uncle's house on the same day that you sent in your petition?—I could not positively say, but it strikes me that we did; we did get the keys afterwards.

577. Who did you get the keys from?—Mr. Taylor took us, and an official from the consulate.

578. Mr. Saunders' clerk?—Yes.

579. He met you there?—He and Mr. Taylor came to our hotel, and took us to show us the things.

580. Do you recollect the state of the door, was the door locked when you got there?—Mr. Taylor told me——

581. Never mind what Mr. Taylor told you; I ask you in what state you found the door when you got to Mr. Woodhouse's house?—Mr. Taylor took out the key and undid the padlock; I saw Mr. Taylor open the door.

582. Mr. Taylor had a key and opened the door?—Yes.

583. What did you find when you got into the house?—We found the place in great confusion, the papers all about, and money, valuables, and manuscripts; there were some silver things lying about; there was a large silver salver lying on the bed; on the chairs there were some silver curiosities.

584. Did Mr. Saunders join you at your uncle's house on that occasion?—I do not think he did.

585. Did he on any subsequent occasion?—I do not recollect Mr. Saunders going with us to the house.

586. You never saw Mr. Saunders in your uncle's house after your arrival?—I do not recollect that I did.

587. You never saw him at any time at the house at the same time that you were there?—I cannot recollect that I did; we went every day; I do not think he went to the house.

588. Did you hear anything about any robbery that had taken place long before?—No; we did not hear of that until afterwards.

589. When did you hear of it?—We were told about it when we were in London.

590. After you had left Corfu?—Yes; after we had left Corfu.

591. What was it that you heard?—We heard that Mr. Woodhouse's servant had robbed the Signora of various things, and that he was committed to prison for it; those things the Signora had no business to take; we made her a present of the furniture; she had no business to take those things, we did not know that she had them.

592. Did you take any inventory on going to your uncle's house, of the things that you saw?—We began an inventory, but as I was out very frequently, Mr. Woodhouse packed the things, and put them down as he packed them, and therefore it took a long time. I did not pack any of the things myself.

593. You brought the principal bulk of the things home with you?—Yes.

594. And some you have received since?—Some we have received since.

595. Were any of those things known to you by description?—No, they were not known to us. Mr. Woodhouse did not write and tell us anything about his collection.

596. You married the sister of the last witness?—Yes.

597. Was Mr. Woodhouse on terms of intimacy with you?—Not with me, but with Mrs. Woodhouse. I was not intimate with him.

598. Did he frequently correspond with your wife?—No, he did not often write.

599. Had you any reason to believe that he would leave you any part of his property?—Mr. Woodhouse wrote for the names of our children.

600. At what date?—It was some time ago: I cannot tell, six or seven years ago.

601. When did you first hear of the British Museum having a considerable bequest of the articles?—We heard of that from Mr. Saunders; he sent us a copy of the document.

602. You say you heard of the bequest from Mr. Saunders?—By a letter from Mr. Saunders.

603. When did you hear of the ship being sent?—We heard that before we went out.

604. Do you recollect from whom you heard it?

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it ?—Yes; but I think it would not be proper for me to mention from whom I heard it.

605. What were the steps you took in England?—We submitted the document to an eminent counsel.

606. Upon the advice of that counsel you went out to Corfu ?—Yes.

607. Did you ever make any charge against Mr. Saunders, whilst in Corfu, of having neglected his duty in any way ?—No.

608. Did you ever write to any of the authorities here, complaining of the conduct of the consul ?—I wrote two letters to the Trustees of the British Museum.

609. What was the date of those letters ?—One in November, and one in December last.

610. Have you a copy of those letters ?——Yes; but I have not brought them with me.

611. You knew that Mr. Saunders was a consul, amenable to the Foreign Office ?—Yes; we made no complaint, only as far as is contained in those letters.

612. *Chairman.*] The letter, printed at page 5, appears to call upon you to declare your intention to recognise or to dispute the last dispositions of the deceased, and say, that you must state which your determination is. I understand you to say that you were told by Mr. Saunders that you must declare your determination to be that you would recognise the testamentary disposition ?—Yes; but the moment we received this letter, we went to our legal advisers, and they said, "We will meet you at the consulate, and see if we can induce the consul to leave it an open question."

613. This letter itself says that you must state whether you will recognise or dispute the testimentary disposition of the deceased; now I understood both Mr. Woodhouse and yourself to say, that you were called upon positively to recognise it, leaving you no alternative ?—Yes, I consider this letter says that. It says, "which determination on your part must naturally form the basis of all subsequent proceedings in the matter." After the conversation I had, I thoroughly understood what was meant.

614. You understood that conversation left it not in the alternative, but that the intimation to you was, that if you wished to touch the property at all, you must recognise the disposition ?—Yes.

615. You mean to say that the conversation put upon the letter, and interpretation, in your mind, which the letter itself does not bear upon the face of it ?—The letter is not sufficiently explicit, but after the conversation it made it clear to me what was required.

616. You understood it to have been a positive requirement, that before you touched the property, you should accept the bequest to the British Museum as valid ?—Undoubtedly.

617. Mr. *Layard.*] Did Mr. Saunders ever inform you that he had given any antiquities to the British Museum besides the coins ?—Yes.

618. When did he tell you so ?—On one of the visits, I do not know which; he told us on one of the visits, that he had sent some antiquities, and he explained why he did so; and that they had introduced the word antiquities themselves at the consulate, to cover the Ithaca necklace, and some other few things.

619. You were aware when you came back from Corfu, that the British Museum had received antiquities besides coins ?—A few things.

620. You did not go to the Foreign Office before you went out to ask for any letter of recommendation to Mr. Saunders ?—No, we did not; we got a private letter from a retired judge of Corfu, who gave us a letter when we went out.

Sidney Smith Saunders, Esq., called in; and Examined.

S. S. Saunders Esq.

621. Mr. *Egerton.*] You are Consul General at Corfu ?—Yes.

622. Have you been so since 1864 ?—Yes.

623. Have you made yourself acquainted with the two documents referred to this Committee, the Correspondence and the Appendix ?—Yes.

624. You have heard the whole of the evidence given to this Committee both by Mr. Newton and by the two gentlemen who have been examined to-day ?—Yes.

625. Is there any statement that you would like to make to the Committee upon the subject of their inquiry ?—Yes; it was suggested to me the other day that I should make a statement on the evidence before the Committee; I did not quite understand whether that meant that I should make any statement with reference to the evidence taken on that particular day, or a general statement upon the evidence and documents contained in the two Blue Books; however, as I had not the one (viz., the short-hand writer's notes of the evidence) I took the other (viz., the two Blue Books).

626. *Chairman.*] You are invited in your own justification to make any statement to the Committee that you think proper ?—I will read the statement which I have prepared.

627. Having read the two Blue Books, and having heard the evidence, you are prepared to make, in your own justification, this statement, which you wish the Committee to receive ?—Yes.

628. Mr. *Egerton.*] Are you aware of the exact nature of the charge which you have to meet here ?—I cannot say that I am; I state distinctly that I come as a witness, to be examined in the same way as any other witness, because, as I understand, there is no charge.

629. Will you read the statement which you have prepared ?—Before leaving this room the other day, it was suggested that I should furnish the Committee with some statement of my own as a convenience to myself; I expressed a wish that any points should be indicated to which it might be desired that my attention should be directed; but the matter being left entirely to myself, I scarcely know where to turn in order to meet this suggestion, the more especially as the subject has been already so fully treated in the Correspondence before the Committee; this difficulty is further aggravated by the fact that the Trustees of the British Museum (Correspondence, p. 35) have not "felt themselves called upon to make a specific charge against me, for which they did not possess adequate materials." I also observe that "the Trustees are quite aware that the evidence to which the Queen's Advocate refers" (Correspondence, p. 32) "possesses no legal weight," but as they aver that "the conclusion at

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at which they arrived was drawn from the statements of Mr. Saunders himself," I proceed to notice, *seriatim*, the several points on which the Trustees declare "they placed their case" (Correspondence, p. 35); the points are set forth as follows: "1. They found a public officer giving different accounts of the same transactions. 2. They found the statement of that officer contradicted by the statements of others. 3. They found that an important and most necessary duty, that of making an inventory, had not only been neglected, but that the performance of it had been refused. 4. They were led to believe, in the first instance, that the entire collection had been forwarded to them. 5. That the Consul General had taken possession of that collection without making an inventory of it, and had forwarded to the Museum only a portion of the collection, thus taking upon himself to dispose of the testator's effects, not only without sufficient authority, but in opposition to an authority, which he had himself recognised, viz., the testamentary directions of the deceased." First, then, as regards different accounts of the same transactions. This allegation would appear to consist in the fact that at one time I wrote to inform Mr. Newton (App. p. 193) that I had "secured the donation of Mr. Woodhouse's coins and other valuables for the national collection, by a document executed in the presence of competent witnesses," and that on another occasion (Appendix, p. 217) I had said that the bequest was urged upon the deceased in his latter moments, when the context was not dictated by himself, and when obviously incapable of accurately appreciating the precise bearing of terms and phrases supplied by others (Corr. p. 35). Herein it is alleged that a contradiction is found, although these two statements have not been considered in other quarters necessarily irreconcileable with each other (Corr. p. 40). It has always been maintained on the one hand that the testator was competent to make this bequest, all the circumstances of the case, especially his previous declarations on the subject, being considered; but the actual words and phraseology employed, not having been suggested by the deceased himself, as fully explained in the Correspondence (p. 41) the precise meaning and intent of any ambiguous expressions therein must be best known to those who compiled the instrument. I would here submit, as a remarkable circumstance, that amidst all the mass of so-called evidence with which this case has been encumbered, Mr. Vice Consul Cortazzi, who took so prominent a part in the drafting and execution of the deed should never have been questioned upon these important matters. I now propose to supply this deficiency by an affidavit on his part, which, with the permission of the Committee, I would beg to peruse.

630. *Chairman.*] Mr. Cortazzi is at Corfu?—Yes. "Know all men by these presents that on this 16th day of July in the year of our Lord 1867, personally came and appeared before me, Sidney Smith Saunders, esquire, her Britannic Majesty's Consul General in the Ionian Islands, Mr. Frederick A. Cortazzi, British Vice Consul at Corfu, who did duly and solemnly declare and state as follows: Do you remember under what circumstances the words 'and other antiquities,' were inserted in the bequest of the late James Woodhouse?—Perfectly; the words 'and other antiquities,' were inserted more particularly with a view of obtaining for the British Museum an Ithacan necklace, which the late Mr. Woodhouse considered worthy of that establishment. Do you remember my going with you to meet Dr. Zambelli at the Reading Club on the afternoon when the instrument was executed, in order to explain the circumstances of such addition having been made, and the purpose thereof?—Certainly; it was to explain to Dr. Zambelli why the words 'and other antiquities' had been added. Dr. Zambelli read over the instrument carefully, and approved of it. How long prior to the execution was the instrument first draughted by you in its altered shape?—Executed immediately after I had written it; indeed the ink was hardly dry. Having taken it with you to the reading-room where Dr. Zambelli had appointed to meet you, how soon after did you proceed to Mr. Woodhouse's apartments to execute the same?—About half-an-hour after; as soon as Dr. Zambelli had read it. Did you retain it in your custody up to the time when you read it over to Mr. Woodhouse?—Naturally I did so. On reading it over to the latter, did Mr. Woodhouse make any remark as regards the expression 'and other antiquities?'—He made no remark on the subject. Did he mention anything about a packet having been prepared by him, containing objects intended for the British Museum?—Not a word. Did he make any other remarks of a nature to enable you to comprehend more precisely what may have been his intentions as regards this bequest?—No, he seemed satisfied. And I, Frederick A. Cortazzi, do solemnly and sincerely declare that the foregoing statement is correct, and contains a true account of the facts and circumstances; and I make this solemn declaration conscientiously believing the same to be true; and by virtue of the provisions of an Act made and passed in the sixth year of the reign of his late Majesty, intituled, An Act to repeal an Act of the present Session of Parliament, intituled, An Act for the more effectual abolition of oaths and affirmations taken and made in various departments of the State, and to substitute declarations in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths and affidavits, and to make other provisions for the abolition of unnecessary oaths.—*Frederick A. Cortazzi.* Thus declared at Corfu, at the British Consulate General, the day and year first before written, before me, *Sidney Smith Saunders.*" From these expositions it will be observed, that the contested meaning which the terms and phrases employed were intended to convey, is fully borne out in accordance with my explanations thereof throughout the course of this correspondence; the remaining portion of this affidavit will apply to the second point, namely, that the Trustees found that my statement was contradicted by the statements of others. The nature of this contradiction is not here explained, but I may perhaps hardly err in assuming, that allusion is here made to Dr. Zambelli's statements upon the subject of the execution of the deed, and to the alleged suggestion on his part, with regard to a general inventory (App. p. 136). It will however be observed, by Mr. Vice Consul Cortazzi's depositions on this head, and by the details supplied by myself in the subsequent Correspondence, when for the first time made acquainted with such allegations (p. 41), that the drafting, and execution of the instrument

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instrument on one and the same day, and the reading that instrument over to the deceased, for the first and last time by Mr. Cortazzi, and not by Dr. Zambelli at all, and this immediately prior to the execution thereof, at one and the same interview, are incontestable facts. It may not, however, be difficult to perceive that the first reading adverted to by Dr. Zambelli was that of my proposed letter, addressed to the Trustees of the British Museum, submitted to, and approved by the deceased the previous day (Correspondence, p. 41), and not the instrument itself, which had assumed a different form and context on the following day, as already explained in consequence of Dr. Zambelli having found the deceased physically incapable of affixing his signature to the proposed letter. I now pass on to the third point, namely, that an important and most necessary duty, that of making an inventory, had not only been neglected, but that the performance of it had been refused. With regard to any duty considered to devolve upon *me* in this respect, I have already explained, at pp. 44, 45 of the correspondence, that, "the duty was not mine in any case," but one strictly appertaining to the trustees of the deceased, and not to me. But in addition to the arguments already advanced as aforesaid, I may be allowed to cite in support thereof the testimony of the British Museum itself, as personified in the officer of that establishment charged with this inquiry at Corfu. By turning to the Appendix (p. 142), it will be observed that among the first inquiries addressed to Mr. Taylor, the managing trustee, Mr. Newton asks, "Is he not aware that it is usual after a demise, for the persons acting as trustees to make an inventory of the objects committed to their trust, and to have that inventory drawn up in a regular legal form, and duly attested?" It is hereby manifest that this duty was not considered as incumbent upon *me*. As to the relative advantages and disadvantages to be derived from such a formality, I have already endeavoured to show that the latter must have far, very far, outweighed the former (Correspondence, pp. 44, 45, and 76); and it may be superfluous to recapitulate here the arguments advanced to this effect. But the question of delay has so important a bearing on my proceedings in this respect, that I must again advert to the highest authority on this head (Appendix, pp. 34 and 35), Mr. Newton having recorded his opinion that "action should be taken with the utmost promptitude, and at the same time with as little publicity as possible," and Mr. Layard having "recommended that the collection should be shipped with as little delay as possible," the Principal Librarian made requisition to his Grace the Duke of Somerset to instruct the naval authorities at Malta to have a ship in readiness at Corfu to receive the collection, in consequence of which, by the extraordinary prompitude of the Admiralty, H.M.S. "Enterprise," was sent at once from Malta, arriving at Corfu 10th March, exactly four days after a requisition for a ship of war had been made by Mr. Panizzi. And yet it would now be averred that I should have instigated proceedings, not indeed devolving upon me, but proceedings which would not fail to involve much delay and perplexity, and whereby, as I have already sought to show, the interests of the British Museum were certainly the least likely to benefit. With regard to the alleged suggestions on this head which have been attributed to Dr. Zambelli (Appendix, p. 136) it will be seen that Dr. Zambelli declares for himself, at page 137, that after the execution of the deed on the 24th of February "he had no occasion to be consulted, nor had he interfered, directly or indirectly, in the steps taken after Mr. Woodhouse's death, either in the interests of the heirs-at-law or of the British Museum," a declaration wholly irreconcileable with the allegation of such a suggestion having been made to me on his part, "immediately after Mr. Woodhouse's death" on the 26th February, as set forth on the following page. I conceive Dr. Zambelli considered that paragraph (previously inserted by Mr. Newton) as struck out with others. I now come to the fourth point, "That the trustees were led to believe in the first instance, that the entire collection had been forwarded to them." I had been distinctly instructed by telegraph (Correspondence, p 3) to "send the things home in the manner suggested in my Despatch of 26th February." By turning to that Despatch (Correspondence, p. 1) it will be seen that in transmitting an authentic copy of the bequest, I spoke of "some valuable antiquities," which Mr. Woodhouse had long since expressed an intention of presenting to the British Museum, and which his trustees were directed to make over to me, together with his coins, for the purpose of transmitting the same to the British Museum on his behalf. These, then, were the "things" adverted to in the telegram, namely some and not all of the antiquities in Mr. Woodhouse's collection, to be made over to me by his trustees for this purpose. The manner of transmission which I had suggested was that these objects should be sent in a certain strong box already prepared by the deceased for the purpose, and that this box should be forwarded by the first ship of war proceeding to Malta. Here again is no indication of any, the most distant, notion on my part of receiving or forwarding the entire collection of Mr. Woodhouse's antiquities to be sent in a single box. A second box has since been spoken of by others, but I only alluded to one such box, and knew of no other. In fact, it was subsequently found, after diligent inquiry by Mr. Newton, that the other had been appropriated during Mr. Woodhouse's lifetime to domestic purposes. (Appendix, p. 162.) The inventory or invoice sent to the British Museum overland on the 27th March, as received on that day from Mr. Woodhouse's trustees, was characterised as a list of articles from the collection, &c. (Appendix, p. 108); and again in the letter which I addressed to the Trustees of the British Museum on the 19th March (Correspondence, page 64) the same definition is conveyed of "coins and other valuables from the collection," &c. On the other hand, when the first letter of acknowledgment was addressed to me by Mr. Panizzi, on the 2nd May (Correspondence, p. 6), announcing the safe arrival of the "coins and other antiquities," and expressing the especial thanks of the Trustees "for the zealous and successful exertions made to give effect to the intentions of the donor;" it could hardly have been conceived by anyone more or less familiar with Mr. Woodhouse's antiquities, that the entire collection had been so transmitted. But when again, on the 19th May, after deliberate examination and report on "the very valuable collection of coins and other antiquities" which the Trustees had had before them, I was a second

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time honoured with the thanks of the latter in the unqualified terms recorded (Correspondence, p. 7), I am at a loss to conjecture how any possible misapprehension on this head should have occurred, in the absence more especially of certain remarkable objects already seen and reported on in that collection, although wholly unknown to me. But independently of my official communication already adverted to, I had also addressed a private letter to Mr. Newton, upon the subject of this bequest, on the day of Mr. Woodhouse's demise (Appendix, p. 193), wherein I alluded to his coming out himself, if he should think it advisable, in order to determine what was worth selecting, or otherwise, if he had any special directions to give me in the matter, praying that he would furnish me with the requisite instructions for my guidance therein. I never received any answer of any kind to that letter. It should at the same time be explained, that I addressed myself to Mr. Newton, because it was at his instigation that I had been induced to move in the matter (Appendix, p. 10); and again it will be seen that on a subsequent occasion (Appendix, p. 34) Mr. Newton had already explained to me all the difficulties of the case in the autumn of 1865. It was never suggested to me that Mr. Woodhouse meant to give his entire collection of antiquities to the British Museum, and circumstances would tend to indicate the contrary. We have again the authority of Mr. Newton himself on this head, in his report to Mr. Panizzi of October 1863 (Appendix p. 101), that Mr. Woodhouse had promised certain objects therein adverted to, but not the entire collection. The words there are, "all those objects."

631. You say that that is the proper construction of the words, "all those objects"?—Yes. On the 18th September 1865 (Appendix p. 135), we find Mr. Woodhouse himself writing to Mr. Newton, and speaking of a certain terra-cotta lamp which he would take care to put up with his "coins, &c." when sent to the British Musuem, but making no allusion whatever to his entire collection. Furthermore, it is stated that he hoped to do this before Christmas; and it can hardly be assumed that he intended to dismantle his museum altogether, and to send his entire collection of antiquities as mere *et cætera*, without adverting to any of the more remarkable objects of interest therein comprised; a collection of antiquities which is said to have been full of very valuable articles; yet none of them are mentioned, unless under the head of "et cætera." But did he carry out any such intentions, be they what they may? No; and it may be safely affirmed that not one article among his entire collection of antiquities, not even a single coin of that precious series, would have reached its present destination but for my persevering exertions in this respect. Finally, to close this discussion as to the intentions of the deceased on this head, I would beg to submit an affidavit of one of his brother officers in the Commissariat Service, a subscribing witness to the bequest, who, in answer to the questions addressed to him, replies as follows. I have the questions here and the affidavit.

632. Where is he now?—He is now at Corfu. Shall I read the affidavit?

633. Do as you think most judicious?—They are both the same, but the affidavit is a little fuller.

634. Mr. *Layard*.] Before whom was that affidavit made?—Before Mr. Cortazzi, on the morning of my departure, the 16th day of July. I will read the affidavit: "Know all men by these presents, that on this 16th day of July, in the year of our Lord 1867, personally came and appeared at this office, Mr. George Shepheard, a retired assistant commissary general, who did duly and solemnly declare and state as follows: 'Were you well acquainted with the late Mr. James Woodhouse?—Yes. I knew him for some years, but never visited him but on two occasions; on the latter as a witness to a document bequeathing his coins to the British Museum, and other antiquities. Were you not brother officers of the same rank in the same service?—The same service, yes. The same rank, no. He was a deputy commissary general. Did Mr. Woodhouse ever speak to you upon the subject of his intentions of giving any objects to the British Museum?—Yes. I am under the impression that he intended to sort and pack up the best of his coins for the Museum. Did he ever tell you that he intended to give or bequeath all his antiquities to that establishment?—I am under the impression that he intended to send the best of his coins, as also any curiosities worth forwarding. I never heard him say anything definite with respect to his other antiquities. I never saw either his collection of coins, or his other antiquities. Did Mr. Woodhouse make any observations upon this subject, when the bequest was read over to him, and when in your presence he affixed his cross thereto?—Not on the subject of the deed; but on mention being made in it of the length of residence of Maria Costantini with him, 50 years, he observed in Italian that the period was longer than the 50 years. The words he made use of were *anche di piu Credo*, I think; and I, George Shepheard, do solemnly and sincerely declare, that the foregoing statement is correct, and contains a true account of the facts and circumstances; and I make this solemn declaration, conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the sixth year of the reign of his late Majesty, intituled 'An Act to repeal an Act of the present Session of Parliament, intituled an Act for the more effectual Abolition of Oaths and Affirmations taken and made in various departments of the State, and to substitute Declarations in lieu thereof, and for the more entire Suppression of voluntary and extra-judicial Oaths and Affidavits, and to make other provisions for the Abolition of unnecessary Oaths.' George Shepheard. Thus declared, at Corfu, at the British Consulate General, the day and year first before written; before me, Frederick A. Cortazzi, Vice Consul." The fifth point, that of the alleged taking possession of the collection and forwarding to the Museum only a portion thereof, has no foundation in fact; for I was acting in conjunction with the persons deputed by the deceased to act as trustees, who, in virtue of the powers with which they had been invested, made over to me certain articles for a specific purpose corresponding with an inventory thereof, delivered under their sign manual. Being thus a mere consignee in this respect, I had no power to dispose of any other portion not recovered as aforesaid, and not comprised in such inventory. A similar fallacy is inferred in the account given by Mr. Newton of his first interview with me on his arrival at Corfu in June 1866 (App. p. 38), on which occasion it is

averred, "Mr. Saunders said that Mr. Woodhouse having died intestate, he as Consul, and by virtue of a treaty between Greece and England, administered to his effects;" my confutations on this head being supplied at pages 46 and 47 of the Correspondence, section 1, showing that I was co-operating in pursuance of the solicitation of the Managing Trustee and not in virtue of treaty rights. Moreover, it will be observed from my letter to Mr. J. Woodhouse as one of the heirs (Correspondence, p. 77, Incl. 1), that, in transmitting to him a copy of the instrument under which the bequest was made, I adverted to the "testamentary dispositions on the part of the deceased upon which it is probable that letters of administration will be granted to the next of kin." The deceased is also spoken of as the testator in the body of the instrument. In fact it has been observed that the instrument has been throughout treated and called testamentary (Correspondence, p. 39). As regards the heirs themselves, the freest option was open to them under my letter of 26th March 1866 (Correspondence, p. 5), to recognise or to dispute the last dispositions of the deceased, as the basis of all subsequent proceedings in the matter. After due consideration and consultation with their legal advisers, they resolved "to respect the intentions so expressed," as by their petition to this effect (Correspondence, p. 5). Consequently, on the verification of their titles in due form, they had to recover in like manner from the trustees of Mr. Woodhouse the residue of the property accruing to them. The hypothetical case now suggested by Mr. Newton, as a means of overcoming at that period all difficulties connected with the respective claims, namely, to have sent the whole of the coins and other antiquities under joint sequestration to England, must have involved insuperable difficulties, and was certainly never contemplated in the instructions conveyed to me, or in the discussions antecedent thereto. One thing, however, may be considered certain, namely, that had the heirs resolved to dispute the testamentary dispositions of the deceased, instead of recognising them as they have done of their own free will and consent, they could hardly have suffered any prejudice from the fact that a portion of the property had been securely deposited in such a locality as the British Museum. If, however, it be conceived on the other hand that the Trustees of the British Museum can establish a valid title to any objects found in the possession of the heirs, they will doubtless take suitable steps with the view to recover the same. I considered that it was no injustice to the heirs if the property was securely deposited there if they had a claim upon it; it was not a question of its going into improper hands, for there it was, and if they had refused, which they might have done, to give me an inventory after I had sent off the property, I should have communicated to the British Museum that they should hold the property in reserve until the matter was discussed; but when they gave me a recognition, I sent it off, and there was no further question about it.

635. Mr. *Egerton.*] Are there any further observations that you would like to make in consequence of the evidence you have heard to-day?—I can hardly collect together all that I have heard; I have heard so many things that have astonished me, and that I could not at all understand.

636. You have heard some allusion made to statements which were made by Mr. Woodhouse and Mr. Puddick as to your treatment of them; your refusal to give them any information, or to give them access to their uncle's house; likewise your general disinclination to assist them in the object for which they came. Those, I think, are the points that you ought now to consider, and give the Committee, as well as you can recollect, an account of what passed?—First of all, as a summary, I may say that during the whole time they were at Corfu we were on the best of terms; I never heard a complaint from them of any sort or kind, and I had no idea that they had any complaint to make. The account that both of them gave of the two lawyers, Sir George Marcoran and Mr. Pieri, coming with them to the consulate was more or less correct. They came and had a discussion, but I almost forget to what they said it was directed; it was with reference, I think, to the validity of the bequest, and to their intention to carry the matter into the local tribunals. I rather think that some other interpretation was given to it, but I do not remember what; but the discussion was with reference to the validity of the bequest, and the intention of the heirs to bring it before the local tribunals, as reported in my letter to Mr. Panizzi of the 30th June.

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637. *Chairman.*] Do you distinctly negative the idea that, before giving them any assistance, you required them to recognise the bequest to the Museum?—Certainly; I never required them to do anything.

638. Mr. *Egerton.*] You held out no threats to Mr. Woodhouse?—None, the most distant.

639. You heard something described about the gift of a ring; can you give the Committee any information upon that point?—Yes, I can; these gentlemen came to receive the rings.

640. Did you ever see them in the house of Mr. Woodhouse?—Never.

641. Was it always at the consulate that you saw them?—Yes, always; that is to say, it was never at Mr. Woodhouse's house; I may have met them somewhere else. They came one day and they asked if they might have the rings; the things had been sent to the Museum, and had gone long before; but when there was a question about the rings, the managing trustee, Mr. Taylor (for the other took no part), said the settings of the rings are modern.

642. Who is Mr. Taylor?—He is now a banker, he was formerly a shopkeeper; he kept a general dealer's shop at Corfu, but now he is a banker there.

643. Was he banker to Mr. Woodhouse?—Yes, and for Signora Costantini, and they had implicit faith in him, so much so that Mr. Woodhouse deposited in Mr. Taylor's hands a box containing 800 sovereigns, without taking any receipt, or at all events purporting to contain 800 sovereigns, but for which Mr. Taylor said, "I cannot give a receipt without knowing what it is;" he said, "Never mind, I do not want it, I want you to keep it." They came up to me one morning, and said, "May we have the rings?" I said, "Certainly, you are entitled to everything;" and very shortly after in came Mr. Taylor who was the proper person to receive them, although, of course, I should not have made any scruple in recognizing their title even in his absence. They came in as I have described, and when they asked for the rings, I said, "Certainly, here they are." They looked them over, and there was some difficulty in ascertaining the

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number of them, there were so many; but at last they were turned out on the table and counted. When it was all done, Mr. Woodhouse, I think, said to me, "I think you admired one of these rings?" He quite surprised me when he said so, for we had had no conversation upon the subject. I said in reply that there was a ring which I thought was very curious, it had a boar's head upon it, and he said, "We will see if we can find it." He looked them over, and he shortly did; what he said to Mr. Puddick I do not know, but after conversing together, they offered me this ring, and I accepted it, considering that they did so, as they had never had any question with me on any matter, as a sign of their entire satisfaction; at least, that was my view of it.

644. As far as you knew, you did not consider that you had had any quarrel with them?—Never, I never had a question with them, except when they first came with the lawyers to discuss the question of their title to inherit, and their intention of throwing the matter into the local courts, there was no further discussion than that. I received a note subsequently (Corr. p. 77, Incl. 2), and I sent them a note (*Ibid* p. 5, Incl. 2), without having any further communication with them. I received their petition signed, as you will see in the correspondence (*Ibid*, Incl. 3.)

645. You heard what both of those gentlemen stated as to the condition in which they found Mr. Woodhouse's house; can you throw any light upon that?—No, because I was not there at the time. I know, however, that it is stated in the correspondence that the house was in a state of complete disorder; it is mentioned in Mr. Reichardt's evidence, and it was usually so; it was found so when we went there, and I reported it in one of my late despatches. It was hardly likely that our investigation as to where the coins and other things were, moving boxes into the library, and the like, would restore to order that which was chaos before.

646. When did you first remove anything from Mr. Woodhouse's residence to the consulate?—About the time that the "Enterprise" came, whether it was immediately before or after, it is difficult to say, but I think it was probably after.

647. Was it for the purpose of making a selection of what things should be sent to the Museum that you removed them to the consulate?—When the "Enterprise" came, it was a question then of putting together such things as the British Museum might be entitled to receive, and the difficulty was to ascertain, in the absence of all information, what could be considered as classed under "other antiquities," and of such a character as the British Museum might consider worthy of a place in the establishment. Mr. Taylor then suggested that Mr. Reichardt, who was a connoisseur, particularly in coins, should be called in as an expert, and he thereupon assisted in pointing out the various articles which he thought were desirable, and would be valued, in addition to such other things as were palpably desirable, and then those articles were taken to the consulate. It was not exactly settled that everything that was taken should be considered as for the British Museum, but that was to be more or less subject to further consideration.

648. Had you any conversations with Mr. Woodhouse, before his death, as to the probability of his wishing the British Museum to have many of those things?—I had not any conversation myself about it, but on different occasions I spoke to him, and I can mention that after the deed was signed, I had a conversation with him, and he said that what I had done was an inspiration of God.

649. Who said that?—Mr. Woodhouse said that.

650. *Chairman.*] Mr. Woodhouse said that on his deathbed, after the deed was signed?—Yes.

651. Mr. *Egerton.*] Although very old and weak, he was in the full possession of his faculties?—Yes, but he had a peculiarity; he spoke to me for a long period, after the deed was signed, entirely in Italian. He told me some long stories, but always in Italian, which was very peculiar, but still he was in possession of his faculties; but I should be induced to say that he was hardly so fully in possession of his faculties as to be able to appreciate the nice turn of a phrase.

652. He was a perfect master of the Italian language, was he not?—Quite so.

653. Had he ever been in the habit of talking to you in Italian?—Never to me.

654. What was exactly the hour when the deed was signed?—Very soon after five o'clock on Saturday.

655. He died on the following day, did he not?—No, he lived through the Sunday. I saw him between 12 and 1 on the Sunday, and he died at a late hour, either on the Sunday night, or on the Monday morning. He lived for 36 hours after the instrument was executed.

656. He told you many things; did he in conversation make any particular allusion to any articles?—Nothing; he said this, speaking in Italian, that it was an inspiration of God, and there was another thing which I will tell you: he referred to something that had happened on a former occasion, when a collector of customs, an Englishman, of the name of Cartwright, had died at Corfu, he had done something for his daughters; he had put them to school; they had married, and had turned out well; that was another inspiration.

657. *Chairman.*] Do you cite this, to show that he was in full possession of his mental faculties?—Yes; although there was that peculiarity with him, that he spoke in Italian.

658. Mr. *Egerton.*] When did you first hear of the heirs of Mr. Woodhouse?—I wrote to them on the day that Mr. Woodhouse died.

659. Did you ever hear Mr. Woodhouse talk about them?—I do not think I ever did.

660. You never heard him express any intention to leave them any property?—I do not think so.

661. Did you see him often?—Yes, but he was a peculiar man, he did not like people to call upon him. His brother commissariat officer had only visited him once, and he did not like visits. He used to come down every morning to Mr. Taylor's reading-room, which was connected with his shop, where he used to see most of the people of Corfu, and the English newspapers as well; there he met almost everybody. I called at his house once or twice, but not frequently, because he did not like it.

662. Is there any other remark that you wish to make on the evidence you have heard?—I would just call to mind that Mr. Woodhouse, I think, mentions that both Mr. Taylor and myself had keys of Mr. Woodhouse's premises. Now, when they wanted to enter they sent to me for the key, and I did not exactly think that the mere send-

ing down the key was a sufficient formality, and, therefore, I sent my chancellier with it; but if there was another key in the hands of Mr. Taylor, it was ridiculous to send to me for it to get in. They also stated something about the seal not being on the door. I was not there to witness it, but I heard from my chancellier that not only was the seal there, but that on their exit, he sealed the house again, and for this reason, that they had not yet been recognised. This shows that he had unsealed the door, and that they had free access to the house, and when they left, the doors were re-sealed. My recollection of what occurred is, that very soon after that, not that they were dissatisfied, but that they were so satisfied with what they found, and with the particular thing that they found, the piece of paper which described the balance of money in their uncle's hands, within some year or so, they were so pleased at ascertaining that what they had heard before was correct, that they decided to recognise the deed. I believe their petition was ready, but not signed, and thereupon they signed it, and gave it to the chancellier, and it was brought to me.

663. You were not present when it was signed?—No; it was not done at the Consulate.

664. I understand you entirely to repudiate the idea of having used any restraint or coercion in the matter?—Yes; on the contrary, I thought that they were perfectly satisfied, and I never could have believed that it was otherwise.

665. I think, in the statement you have read, you stated that you did not consider it your duty to make an inventory; that, as the trustees took possession of the property, you considered yourself absolved?—Yes; the trustees being in power under the will, I considered it was their duty, and not mine; if I had thought it would have been an advantage, I might probably have done it if they had asked me to make an inventory, but they never asked me about it, nor I them; nothing passed about an inventory, and that is stated in the Appendix.

666. Is it not part of the duty of the Consul, when a person dies intestate, to make an inventory of the effects?—Yes; in case of no trustees being named; in case of there being no representatives, of course, it would be necessary.

667. Did you consider yourself absolved from that duty by the fact of trustees having been appointed?—Yes, decidedly; I considered that I had no obligation incumbent upon me in the matter, and you will find that that is the legal opinion (Corr. p. 45.)

668. Why did you not send some inventory of the things to the British Museum?—An inventory was sent; it was produced here the other day; I did not see it, but there was some observation made about its being irregular in point of form; that inventory was not made by the Consulate; it was handed over by the trustees, and the only thing that we did to it was, I think, although I have not seen it, we attached the Consular's seal to keep the papers together; I sent it more as a voucher for what had been received, and I sent it in the original, just as I received it, and within an hour of receiving it. The signatures of vouchers are not usually authenticated.

669. Are you cognizant of the circumstances under which certain other things were found after the departure of those two gentlemen from Corfu, and which were afterwards sent to them; did you send them to them?—No, they were not in my custody; they were in the custody of their agent, and when an opportunity of a ship offered, I believe that they had left instructions that those articles were to be put into an iron chest; I had nothing to do with it.

670. Is there any other circumstance that you wish to mention to the Committee?—I do not remember anything else.

671. Is there anything in the evidence of Mr. Newton, that you wish to comment upon?—No; I have no doubt that he spoke from recollection as correctly as he could.

672. Mr. *Lowe.*] Am I to understand you to contend that your conduct in these transactions has been in all respects such as merits approbation?—I certainly have always considered it so, and I believe that everybody considered it so; I could hardly have believed that there was any question upon it.

673. Mr. *Layard.*] You laid some stress upon your having acted with regard to forwarding to England this collection of coins and other antiquities upon instructions you had received from the Foreign Office?—Yes.

674. In the first page of the Blue Book there is your letter to Lord Clarendon; did you send any other information besides that letter to the Foreign Office?—There were several letters, and one on the 27th of March.

675. The instructions which you say were sent out to you were founded on the letter of the 26th of February?—Yes.

676. In that letter, why did you not say that there were other claimants to the Woodhouse property; no such statement, I believe, is made?—No allusion is made to that.

677. Do not you think that it was your duty to have communicated to the Foreign Office that the bequest was likely to be disputed, and that there were heirs in England who might claim the Woodhouse property?—I had not the least idea that it would be contested.

678. You knew that there were claimants to part of the Woodhouse property?—Yes, because I wrote to Mr. Woodhouse, his next heir, as far as I knew, sending him a copy of the bequest on the very day of his uncle's death.

679. If you refer to your letter you will see that you merely state to the Foreign Office that these coins and antiquities had been left by Mr. Woodhouse, that they were in your possession, and that you wished to know whether you should send them in a strong box to England, or wait until somebody was sent to take an inventory of them; you do not say that it was probable there were persons who might dispute the bequest?—I had not the least idea of any probability of the kind.

680. Was there any law in the Ionian Islands against the exportation of antiquities?—There was an Ionian law of 1847; there is also a Greek law, but I cannot give you the date.

681. At that time, was the Ionian law in force in the island?—Yes, I believe it was; but my recollection of it is that it relates to the exportation of antiquities and not to coins; it does not prohibit the exportation of coins; I think the law says that antiquities shall not be sold for exportation; it is not a positive prohibition.

682. You stated that at your suggestion the words "other antiquities" were introduced into that existing Act, and that you had them introduced in order to include a certain necklace that Mr. Woodhouse had?—More particularly that, as I knew

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I knew of that thing, but I did not know of the other articles which have been mentioned since, and which we did not find.

683. Upon what principle did you make a selection of the articles you sent to the British Museum under the general designation of "other antiquities"?—The Reverend Mr. Reichardt is a German clergyman, residing there, and he was invited to attend and to point out any objects besides the coins which he considered the British Museum would like.

684. You consider that it was entirely optional with regard to what you might think fit to send or not?—Yes; more or less optional; that is to say, we never thought for one moment of sending the whole mass, but the idea was that we should pick out such things as would be appreciated at the British Museum.

685. I see in the inventory sent to England, that there were three meteoric stones and a seal of the Island of Zante, which I presume was a mediæval relic?—Those were mixed up with some other things, and being so mixed up they went, but they were not picked out, they were mixed up with other things in the same way that in a full box containing some gold ornaments from tombs there were also some modern trinkets, which were picked out by Mr. Reichardt and put aside for the heirs.

686. If you had sent over a very large portion of the other antiquities besides, say two-thirds, should you consider that you had acted within the terms of the bequest?—No; I considered that although the deceased had had made a box to send what he intended, and the said box was not full, we could not exactly say that we would take such and such things to fill the box.

687. Had any persons access to the house after you had put your seals on the doors until you had them taken off?—We went several days to search for a will and for the contract of a garden, and inventories; we made great search for them, and I say "we," because I never went alone; my chancellier was always with me, and Mr. Taylor, as a trustee, was always with me; and there was generally a messenger or some other individual as assistant.

688. People generally had not access to the house?—No one.

689. Neither Mr. Taylor nor Madame Costantini?—No; she had certain rooms apart where she remained for a few days, but she had many people about her who were supposed to be suspicious characters; and were said to have carried things off the premises prior to the demise, and, therefore, it was thought that the sooner she was out of the house the better; while she was there she had not access to the other apartments; she had two or three apartments that were separate, the others were closed, and sealed.

690. Those apartments contained the antiquities and coins?—Yes; the antiquities were removed chiefly into the library, the other two or three rooms might have had some small things in them, but nothing of any consequence; the best articles were under double seals, and they were in the library, the access to which was through the other rooms when the rooms were open; I may say that something passed the other day I think about the police, and it was stated that Mr. Taylor very often went there alone.

691. And that he was seen carrying away things?—Yes; but that is an entire fallacy. I have explained that fallacy in the correspondence where the police are alluded to (p. 56). First of all, it will be seen, from the dates given, that the occasions when Mr. Taylor is said to have gone alone were antecedent to Madame Costantini's departure, or subsequently to the arrival of the heirs. By careful attention it will be seen, that as these declarations are given (I do not say that they are absolutely false, they are loosely given), it will be seen that they are either antecedent to the departure of Madame Constantini, or after the arrival of the heirs. As for Mr. Taylor going alone to the premises, he could not do it, because I had the keys, and the premises were under seal. There is another reason, however, why he might have gone alone, which is, that his legal adviser (Dr. Lusi) lived on the floor above, and he might have had occasion to visit him in the same house.

692. Do I clearly understand from you that there was a part of the premises which contained the antiquities and coins, which was under your seals, and which apartments were never entered, except in your presence?—Yes. Mr. Cortazzi was not there; he had gone away for a few days, but he came back just about the time when the "Enterprise" came. He was there afterwards; but at that particular time, when we were looking for a will, he was not there.

693. You gave an answer as to the exercise of your functions at Corfu, and you stated that you were not acting under a treaty; you surely must have been acting either under treaty or under some local law?—No; the reference that I made to treaty rights was as to a case of intestacy. I was not considering this as a case of intestacy, which would give me the right, under treaty, of administering to the property.

694. But it appears to me that, except as regards a particular portion of his collections, which you describe as coins and other antiquities, Mr. Woodhouse died intestate, as this document applies to the particular part of the property alone which was placed in the hands of trustees?—There is a peculiarity in it. This is the draft (*producing the same*) of a former will of his, which is published in that correspondence; but this is the draft which was found there, and it appears that Mr. Woodhouse had wished to substitute Mr. Taylor and another person for the two individuals formerly named; he had forgotten, perhaps, the circumstance, and what particular part they were to take, and therefore he had not mentioned anything more.

695. But that instrument was never executed?—No; it is merely a draft, which was destroyed.

696. It does not affect the intestacy as to the remainder of his property?—No.

697. It was your duty, as I understand, to have made an inventory of that part of his property as to which he died intestate?—I do not consider that he died intestate; we considered that this was tantamount to a will; that this bequest was of the character of a will.

698. Which do you mean?—The bequest by which he left certain things to the British Museum.

699. That particularly specifies certain things?—Yes; they are mentioned specially.

700. Mr. *Howes*.] Is it your opinion that under this deed the whole of Mr. Woodhouse's property passed to his trustees?—I considered that they were acting for the whole of the property as his trustees, and that after having handed over such portions to the consulate as would belong to the British Museum, they would hand over the remainder to the heirs at law.

701. And

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701. And that they would have power to do so under that document?—That they were in possession of all under that document; that was my view. I had a note requesting me to assist them in putting the seals on.

702. Mr. *Layard.*] Did you, at any time, inform the Foreign Office that you had sent to the heirs any collection of antiquities?—I did not send any.

703. Were they handed over to them?—I do not consider that I handed them over. I consider that the trustees handed them over; they handed me over a portion, and the remainder, I think they handed over to the heirs; but I took no part in that.

704. Mr. *Arthur Russell.*] You considered it your duty to remove one of the trustees from the house, did you not?—Madame Constantini was surrounded by a number of individuals who were not trustworthy, and it was suggested to me by the managing trustee that it was desirable she should be removed to an hotel. I took no part in it; but I think it is mentioned that she told Mr. Newton somewhere that I urged Mr. Taylor to do so; but it was not done on my part.

705. Mr. *Layard.*] Did you assist in making any inventory of the property not included in the bequest that went to the heirs?—No; they entered into possession without my taking any part in it whatever.

706. You did not consider yourself answerable for any article that was left in the house, if it should be lost?—No; the seals were on the door, but they were allowed to enter, and there were guards at the entrance to the house; two guards had been placed there from the time of Mr. Woodhouse being in a serious state; I think on the night before he died; and they remained there in charge, independently of the seals and the locks.

707. Mr. *Howes.*] Although you speak of the authority of the trustees, yet from the time of Mr. Woodhouse's death, you, as consul, were in possession of the property under your seal?—Yes; because I was requested to put a seal on as a test of security. I did not consider that it was my own act and deed.

708. You did not consider that, as consul, you had any immediate duties in connection with that property?—Not more than I was requested by the trustee to execute. If he had asked me to do anything that was required on the part of the trustees for their security, of course, as consul, I was bound to assist them.

709. You have been asked as to your own opinion of your conduct; do you consider that you acted with perfect impartiality as between both parties, the Trustees of the British Museum on the one hand, and the heirs on the other?—I may say decidedly that, in my opinion, I did so. I consider that I have steered clear between Scylla and Charybdis. I may have gone a little to the one side or to the other, but I consider that I have taken a strictly impartial line, without in any way doing anything to the detriment of the heirs, or to the detriment of the British Museum.

710. You heard Mr. Woodhouse evidence as to the petition that was signed?—Yes.

711. Who drew up that petition?—It was in their own handwriting from beginning to end.

712. Without any dictation from you?—Yes, without my knowing what the contents were.

713. You have stated that the petition was not drawn up by you?—Yes; the petition of James Woodhouse and John Edward Puddick (Corr. p. 5); that petition was entirely drawn up by themselves; I should say by Mr. Puddick. The Consulate had no part whatever in drawing it up, or in dictating the tenor of it.

714. *Chairman.*] The immediately preceding letter which bears your signature was the information before them when they drew up that petition; was not that so?—Yes; they wrote to me before I wrote that letter. (Corr. p. 77, Incl. 2.)

715. The letter which bears your signature, and which calls upon them, either to "recognise or dispute," is the letter which conveyed whatever information you then gave to them, or did you leave them to collect from your letter of the 26th March what was the purport of your requirements?—It would be difficult to recollect. We had an interview first, and I certainly had not the slightest idea of the contents of this petition. I may have said to them, "If you wish to be recognised, as you have brought no documents out with you, you must make a petition saying who you are, and not come to me merely with your visiting card; declare who you are, and be prepared to substantiate what you state on affidavit." One day I received a note stating "We are come," and so forth. I then write them a letter, to which they eventually reply by this petition, but of which I had not the slightest idea until I received it.

716. Mr. *Howes.*] Therefore the statement on their part is wholly incorrect, that there was any degree of compulsion placed upon them by you?—Yes, certainly.

717. When did you first hear of their intending to enter a protest against that petition?—I never did hear that.

718. Not until to-day?—And not to-day.

719. Did you not hear the evidence of Mr. James Woodhouse?—I did not understand that he said that.

720. *Chairman.*] Did you hear what he said about repudiating the petition the moment it was signed, and so on?—I heard something mentioned, but not very distinctly, about his legal adviser saying, "You may sign what you please, and repudiate it afterwards."

721. The question put to you was, "Have you heard that for the first time to-day"?—Certainly; but even that was so indistinctly heard that I was not quite sure whether that was the tenor of the statement.

722. Mr. *Howes.*] According to your apprehension of what took place, there was no dispute between you and these gentlemen in Corfu?—Certainly not.

723. And you considered that you acted with perfect impartiality to the heirs as well as to the British Museum?—That was my intention.

724. Mr. *Beresford Hope.*] You consider that Mr. Woodhouse did not die intestate?—It might be a question.

725. What was the view that governed your action in the matter?—The intention was to make such a deed as would be considered a valid bequest; a will; that was why he was called a testator.

726. Then that document was a will?—Yes; it was a will in the absence of any other, which we did not find.

727. Mrs. Costantini and Mr. Taylor were the trustees or executors under that will, in your view?—Yes, in my view.

728. I suppose

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728. I suppose you consider that when a man makes a will, it may reasonably be supposed to describe the property that he bequeaths?—Mr. Woodhouse had peculiar notions of his own, and I think it is mentioned that he was asked whether he had anything else that he wished to add, and he said no.

729. As a Consul General I presume you are very well versed in English laws generally, and I suppose that you know there is no such thing as a partial will?—Yes.

730. Therefore if a man makes one will, it will bequeath his property?—Yes.

731. You are to look to his will for his heirs; I suppose you admit that?—I would say that you would do so, and as to what is not mentioned in the will, it goes to the heirs at law.

732. As a gentleman well conversant with the English law, do you consider that such vague terms as other antiquites would convey his property?—I do not quite understand the question, but what is not mentioned in the will I consider would go to the heirs at law.

733. You had no misgiving in drawing up that paper that the insertion of the words other antiquities might carry all that Mr. Woodhouse intended to give to the British Museum?—It was a collection of coins, together with other antiquities; that was the idea. There was no mention of "et cætera."

734. Did it not occur to you that it was a very ambiguous phrase to use "other antiquities"?—It was knowingly so, because I did not know anything of the collection that I could define.

735. Did you not think that the persons to whom this deed professed to bequeath "other antiquities," would claim all the antiquities under it?—No.

736. Did it not occur to you that it would be necessary for some provision to be made in the deed for some responsible person to deal out the two shares of the bequest to the different parties who might claim under it?—My reply is that the Trustees were specially named to hand over certain things to be recovered, and I considered that they were the persons who would hand over the residue.

737. In short, it did not strike you that there was anything ambiguous in the will?—Nothing more than that we had a difficulty in knowing what were the antiquities which either might have been furnished to the British Museum, or which might have been intended for it.

738. With your decided view that this deed removed the responsibility off your own shoulders and put it upon those of the Trustees, why did you not at once correspond with the nephews of the deceased?—It was an official act to announce the death of a man, and send a copy of the deed.

739. You consider that you had some responsibility in that matter?—Yes; it was an official announcement.

740. When once they had reached Corfu, you consider that your professional duties had ceased in consequence of the appointment of those two Trustees?—Excepting as to recognising the proper persons to represent the heirs.

741. Mr. *Howes.*] With reference to some questions that I have asked you before as to the petition signed by the heirs, will you look at page 47 of the correspondence, and read the second paragraph in that page?—"But before the latter could enter upon their inheritance, it was essential that their legitimate title should be distinctly established, which circumstance, as set forth in my letter to the said heirs (page 172), served as a fulcrum to induce them to recognise the bequest as the basis of all subsequent proceedings in the matter."

742. Would you not wish to give some explanation of those words commencing with "served as a fulcrum to induce them to recognise the bequest as the basis of all subsequent proceedings in the matter"?—The explanation is simply this, that when they came I said to them, "Who are you?" "We are" so and so. "Do you recognise or dispute the bequest?" If they had said, "We dispute it," of course it would have been a question afterwards to ascertain in what way the case would have to be treated. If they had said, "We acknowledge the bequest," then the matter would have been straightforward. I left it entirely to their own decision, and having got what I scarcely expected, their petition recognising it, there was no further question upon the subject. If they had decided to dispute the bequest, there might have been many questions, and the first thing then would have been to communicate with the Trustees of the British Museum, requesting that they would hold the articles in reserve until those questions had been settled; but my idea was that nothing could be safer than to have them in the hands of the British Museum.

743. But surely the circumstance of their being heirs or not was a matter quite independently of their recognizing or not recognizing the testamentary disposition?—Yes; but that was the first proceeding; what would they do?

744. How was it "a fulcrum to induce them to recognise the bequest"?—It was the point upon which the argument rested, as to what should be the subsequent proceedings in the case. If they had said, for instance, that they were determined to dispute the bequest, and if that bequest had fallen, then the circumstances would have been so entirely altered by Mr. Woodhouse dying intestate, that the proceedings must have changed entirely.

745. *Chairman.*] By treaty, when a British subject dies intestate, the consul becomes administrator of his effects, does he not?—It is so, in the treaty with Greece; I do not think it is so as a matter of course.

746. Was it so at the time when Mr. Woodhouse died?—Certainly.

747. You do not understand this to have been a case of intestacy?—No.

748. You interpret the document which is on page 1 of these papers, as being the will of Mr. Woodhouse?—As a document which has been considered as of a testamentary character, which I described as such in writing to the heirs, and sending them a copy of it, and which has been described by the Queen's Advocate as of the character of a will (Corr. p. 39).

749. Sufficient to oust you from your title as British consul, to enter upon the administration of his effects?—Sufficient to let the trustees act instead of the consul.

750. You contend that your duty was simply that of the person to whom in trust certain effects were bequeathed on behalf of the British Museum?—I considered myself as the consignee of certain effects which the trustees were to hand over to me for the British Museum.

751. And that your duties did not arise until the persons named by the testator as his trustees had

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had selected the articles, and had consigned them to you?—That is the position, but acting with them in any other capacity which they might require me to do.

752. Acting as their friend, or acting as consul?—As consul, if they required it. If they called upon me to make an inventory, I do not think I could have declined it.

753. I am asking you not what you might have done under other circumstances, but what you consider you have done as consul under the actual circumstances of this case, and I understand you to say that you have not acted as administrator to this property under the treaty, as being the property of an intestate?—No.

754. You regarded it as being the property of a testator who spoke by his will?—Yes.

755. As consul, have you acted at all under that will?—I acted by the request of the trustees, in putting the seals on, and in examinining the premises for the purpose of making a search for a will, for the purpose of searching for inventories, and for the purpose of seeing that the trustees themselves executed their trust.

756. There being a subsequent will, when you made a search for the former will, were you acting as consul, or where you acting as the friend of the trustees?—I was acting as consul at the written request of the trustees, or that of the managing trustee.

757. Under what treaty or instructions does a consul act, when there are competent trustees already acting in the matter?—A consul is bound to assist the trustees in that or any other case at their request.

758. Is it an ordinary transaction, that persons domiciled in Corfu, and having competent powers under a will, should call in the British consul to act for them in the administration of an estate?—Not in the administration of it perhaps distinctly, but to assist them in any matters connected with that administration.

759. Is that an every-day matter, as between persons domiciled in Corfu and the consul?—It would be.

760. Then was your conduct in this matter divided into two parts; that which you took as British consul on the requisition of the trustees, and that which you took as being yourself devisee in trust for the British Museum?—Yes; there were two characters in it.

761. And you acted in both?—I did.

762. When you put the seals on to the property, and kept the keys, and only permitted Mr. Taylor to enter upon the premises in the presence of your chancellier, with keys borrowed *pro hac vice* from yourself, in what capacity were you acting then?—By the written request of Mr. Taylor.

763. It was as the agent of Mr. Taylor that you kept the keys?—As the consular officer, requested to assist him in that capacity.

764. He, according to your interpretation of this document, was what we should call the executor of the will?—Yes.

765. He had jurisdiction over the property and jurisdiction over the keys; was that so?—He must have had jurisdiction over the keys, but he requested me to put seals on the doors.

766. Have you, by virtue of the treaty, as consul, any jurisdiction whatever over the property of the person who died leaving a will, unless that jurisdiction was given to you by the executors or trustees of the will?—I have not. In the treaty I think there are two provisions, both as regards British subjects dying and leaving a will, and their power to bequeath property without any interference, and also as to the position of the consul in a case of intestacy. I think the treaty provides for both cases.

767. What provision does the treaty make for the case where there is a perfect will and undoubted heirs, trustees, or executors acting under it?—The treaty merely provides in general terms.

768. What does it provide?—As to the right of the consulate to attend to the different circumstances under which British subjects die in Greece.

769. Does it give the consul any rights additional to those of the heirs?—Certainly not.

770. All he could do would be to act in aid of, but in subordination to, the heirs?—In subordination to the heirs or to the trustees representing them.

771. Am I to understand that when you kept the door under seal and kept the keys, and excluded Mr. Taylor, except in the presence of your chancellier from the access to the premises, you were acting in aid of, but in subordination to, Mr. Taylor?—Certainly; and I have it in his own handwriting.

772. What was the object of his desiring you to act in that capacity?—My recollection of the letter that he wrote to me is, that he had been there, and that he had found the premises in great disorder. I think he said that he found coins lying all over the place and on the dining-room table. He said, "It is most essential that you should come and put seals on the premises;" that is more or less the contents of the letter, which I can produce, although I have it not here.

773. What advantage or protection did they derive from the consular seal which they would not equally have obtained from their own seal?—They considered that the one was an official act, while the other might have been possibly contested; no explanation was given me beyond that stated above.

774. Was it a usual thing, or did you ever do it in any other case?—I do not remember any other case of the kind.

775. Then you do consider that the duties of a devisee in trust for the British Museum were cast upon you by this document?—Yes.

776. As such devisee what care did you take to ensure that all the articles that were intended for the British Museum came into your hands?—They were carefully noted in the inventory that was taken down by Mr. Reichardt, and by the Trustee, Mr. Taylor; possibly also my chancellier may have assisted them. As soon as this inventory was formed, there was no longer any question as regards the articles, and the articles were all packed up, and embarked, although the inventory had not been delivered to me.

777. What authority do you consider terminated all question as to the articles that were selected; the authority of the Trustees, the authority of Mr. Reichardt, or what authority?—The authority of the Trustees acting in conjunction with Mr. Reichardt, as an expert.

778. Did you consider that your duty, as devisee, in trust for the British Museum, had terminated, when the Trustees and Mr. Reichardt had passed their opinion, or did you think it necessary to have any opinion of your own?—I did not exercise any opinion of my own; but I was present.

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779. Did you report to the Trustees of the British Museum, that you had accepted the decision of the Trustees and Mr. Reichardt as sufficient?—There was no special report made; there was merely a general report that such things had been handed over according to a certain inventory, that the articles had been embarked in a ship of war, and that an inventory would be sent overland, when obtained from the Trustees.

780. Were you certain, except upon the statement of the Trustees, that all that was contained in the document making the bequest had been actually given over into your custody for the British Museum?—I do not think that the document can show any measure or quantity; it simply mentioned "other antiquities," which might be defined to the best of our ability.

781. You were concerned, were you not, in the previous preparation of the document?—Yes.

782. And, as you have said, it was considered to have been an inspiration from above?—Yes.

783. In preparing it, did you consider whether it would be clear enough to enable you effectively to discharge the duties which it would cast upon you towards the Museum?—The original intention was (as mentioned in that affidavit of Mr. Cortazzi) as to the coins, and I knew of my own knowledge that Mr. Woodhouse had intended a certain necklace for the British Museum; I had heard that, and certain other antiquities that he meant to send, but I did not know what.

784. Did you after his death, and before you were satisfied that you had discharged your duty as devisee, ascertain that all the articles which he did intend for the British Museum had come into your custody?—It was impossible to know what he did intend positively, as to particular articles, not having seen them, nor having seen the things mentioned as missing, and as having been found in the hands of the heirs; there was no distinct knowledge, beyond the coins and the necklace, of such other articles as he might have intended for the Museum.

785. Have you stated to the Committee all the pains that you took, either before his death, at the time of the preparation of the document, or after his death, to ensure that what he intended for the British Museum came into your possession for it?—I consider that I have explained that acting in conjunction, the Trustee, the expert, and myself, we did the utmost that we could to pick out any objects that might be considered desirable, or that the British Museum might wish to have; and we left nothing that we should have said, or that we thought anybody belonging to the Museum would have said, was a thing which the Museum ought to have had.

786. Then you consider that you fully and completely discharged your duty?—Yes; a very difficult duty.

787. I think you stated, that one of the Trustees was surrounded by persons of a very suspicious character?—Yes.

788. So much so that property might have been taken away, which belonged to Mr. Woodhouse before his death?—Decidedly.

789. In consequence of which you had taken the precaution to place policemen at the door before his death, to prevent the abstraction of any of the property?—That was suggested to me by the managing trustee; I approved of it, and he carried it out.

790. Thereupon, regarding them as they were the trustees, and consequently becoming primarily responsible for the care of the property, yo having already put your seal upon the property the property remained under that seal until i was given over to the persons for whom yo believed it to be intended, the heirs?—Exceptin that from time to time, during the first days thos seals were removed in order to search for documents, and replaced.

791. Among those documents you were searching for a will?—Yes.

792. Did you consider that this last documen was a complete will?—The document when I received it in draft from Dr. Zambelli, was termed a codicil, and he said that he viewed it as a codicil because in his mind he thought from the deceased mentioning two trustees, to be named instead o two others who had left the country, that therefore there was a will. I very much doubted th existence of such a will; I supposed the contrary and therefore I said, "We had better not call i a codicil," but nevertheless it was a case of looking to see whether in point of fact there might b a will.

793. If it was only considered as a codicil, and if you were engaged for a time in making a search for a will, and you failed in finding it, did you take any legal advice as to whether this document constituted a will by itself?—No, the wil was drawn up in conjunction with Dr. Zambelli who was a very able lawyer, and it was considered sufficient.

794. I understood you to say that Dr. Zambelli represented it to you as being a codicil to a prior will?—Yes, in the first instance, not as it was, but as he thought of making it.

795. I understood you to say, that long after the death of Mr. Woodhouse, and therefore of course still longer after the execution of this document, you were searching in vain for a will?—Yes, I spoke of the first few days.

796. You failed in finding a will?—Yes.

797. Either this was a will, or it was not. If it was a complete will, it would have cancelled former wills, but if it was incomplete, then, I ask, did you take any advice as to whether, in the absence of any other document, it constituted a will, and thereby made the property, not that of an intestate, but of a testator?—I considered that it was not the business of the consul to ascertain or to inquire as to the validity of the document, but that it was for the interested parties to make such an inquiry.

798. Is it not the duty of the consul, in a case of intestacy, to consider it his business to administer to the property?—This was not considered as a case of intestacy, but the document was treated as a document which would stand as a will, and it was referred to the heirs in England as such.

799. Then I ask you whether, after having searched subsequently for another will, and not finding it, you took any legal advice to ascertain whether this document alone constituted a will?—No, I considered it to stand as in the first instance it had been thought to be.

800. There is a passage in the correspondence in which Mr. Panizzi asks you to send home the collection entire?—Yes.

801. And you reply, saying, that you do send it home entire?—I considered that remark to apply entirely as to the coins.

802. Do you consider that all the coins to which

the British Museum could be entitled, have been received by them?—Every possible coin that could be found, good, bad, or indifferent, or wrapped up in little papers, was sent to the Museum. I explained that at the time, having done all that I could to send the collection entire.

803. As to the terms "other antiquities," you say that you were not aware what they included, and that you put the words in to cover a particular necklace which has reached the Museum; but the words appear to have covered certain other articles, although it has not been yet ascertained what was in the mind of Mr. Woodhouse when he proposed to leave "other antiquities" to the British Museum?—That would be a very difficult thing to ascertain.

804. Did you take any other pains than those you have mentioned to ascertain what was intended by the words "other antiquities"?—The only possible means of finding out what could have been intended was to suppose what might be worth presenting, and to a certain extent what might be contained in a certain measure which he had left.

805. You made no inquiries of persons who had heard him speak of what he intended to leave to the British Museum?—I am not aware of anybody who could give any information upon that.

806. When you put the words, "other antiquities," into the document, were you aware that anything else could be comprised, except this particular necklace?—Specifically I should say no, but generally I should say yes; certain articles which might be considered as decidedly such things as he would wish the British Museum to have; but on the other hand, not specifically, as I did not know of their existence.

807. You considered that the trustees, with the assistance of Mr. Reichardt, had sufficient authority under this document to select what they chose in regard to the "other antiquities," in sending them to the British Museum?—The object was to do the best we could in selecting those articles that we thought the British Museum would like to have.

808. You thought that you had a right to take upon yourselves to determine that question?—Not myself.

809. I said "yourselves"?—I would say, suggesting to the trustees, if they chose to hand them over; then I should say I was entitled to receive them, and to hand them over to the British Museum; but if I had said, "There is an article which the Museum ought to have," and the trustees had said, "No;" I should say that I had no power to take it.

810. Mr. *Lowe*.] You say, that in your opinion, Mr. Woodhouse did not die intestate?—My view of the case is that this document stood in the place of a will. I am not aware of his having left any other document of a testamentary character than this.

811. He did not die intestate at all, is that so?—It is difficult to say; he left a certain document of a testamentary character, leaving certain articles, and not specifying others.

812. Do you consider that as to any part of his property he died intestate?—I do not see how I can draw any distinction between a part and the whole. A man either dies intestate, or he leaves a will.

813. Did that will cover all his property?—I should say that all of it is not named in it.

814. If the will covers the whole of the property, he did not die intestate, and with what title could Mr. Woodhouse and Mr. Puddick claim anything?—As residuary legatees.

815. Will you refer as to those words in the will?—There is nothing of the kind in the will; I meant heirs-at-law.

816. How long have you been a consul?—Perhaps for 40 years in the service generally.

817. Were you in the first instance vice consul, and where?—I was in the Foreign Office first. I was nine years in the Foreign Office. I entered it in 1826, and I was consul in Albania in 1835.

818. Were you consul at Prevesa?—Yes; and I was consul at Alexandria in 1860.

819. Were you consul in Prevesa from 1835 to 1860?—Yes; and I was consul in Alexandria from 1860 to May 1864; then I became consul general at Corfu.

820. *Chairman*.] How do you interpret your duties under the treaty in case a testator dies, leaving only a portion of his property by will, and leaving a large portion of his property uncovered by that will; do you consider that that casts upon you, as consul, the duties of administrator as to the undevised remainder?—That would be a complicated question, to be decided according to the circumstances of the case, and the local law.

821. Have you, in your experience of 40 years, ever had such a case to deal with?—No.

822. I observe in this document that Mr. Cortazzi says, "The testator had declared that these were the only things for which he desired to provide"; yet I understand you to say that it did not occur to you to take any opinion as to whether your duties as consul, in respect of the intestate property, arose under these circumstances, when no other will was found?—Those terms were translated from Dr. Zambelli's; he had stated that the testator had declared that he had nothing else to provide.

823. The assumption on your part, when this deed was executed, appears to have been that there was another will already in existence?—Not on my part, but on Dr. Zambelli's.

824. The legal gentleman who drew this document, drew it in order to provide for the devisable part of the property, whatever that was; the rest had been already provided for?—Yes; that was his intention, and it may have been rather ambiguous.

825. You, in consequence of that, made a search for the other will?—Yes.

826. Failing to find that other will, and being aware that only a portion of the property was provided for by this will, when the rest of it that was not provided for fell into your hands, as being the administrator of unbequeathed effects, it was to you a new question, after 40 years' experience, and upon that new question, as I understand you, you took no advice?—I waited for the case to elucidate itself on the arrival of the heirs, and on their arrival to see whether they determined to recognise or dispute this document; and they having decided that they would recognise it, and having ascertained their qualities as heirs, and they having entered into possession of their property, I took no further steps.

827. Do you consider that it was in your custody as consul, or in the custody of the trustees until the time arrived when it was given over to the heirs?—I had the keys, and the premises were under seal, but on the other hand the trustees

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tees were the persons to whom the premises were eventually consigned, and I took no further part in it.

828. You were holding the keys by direction of the trustees?—Yes.

829. Not as consul under the treaty?—No, not as consul under the treaty, but as consul acting on their behalf, and at their request.

830. In obedience to any instructions which you might receive from them?—Yes.

831. Mr. *Layard.*] You dealt with the objects which were supposed to have been transmitted by this testamentary document in two ways: half of the collection you took into charge and gave over to the British Museum, and the rest you left the Trustees to deal with. Upon what principle were you acting when you did that, or why did you not deal with everything in the same way?—I considered that the one portion of it was handed to me as consignee for the Museum, which I was bound to send in the way I had been instructed to do, and that the other portion was to be received by the other parties to be consigned to them by the same parties who had consigned to me one part, that is to say, to whomsoever should be eventually recognised as heirs-at-law.

832. You say that you dealt with the half-collection which you sent to the British Museum as the consignee of the Trustees?—Yes.

833. And not as acting under the will?—No.

834. *Chairman.*] In this document called the will, which you yourself drew, you are desired by Mr. Woodhouse to take charge of the articles in question when recovered from the hands of the Trustees, and to transmit them to the British Museum?—Yes.

835. You were, therefore, acting under this document when you accepted the duty of representative of the Museum in this matter?—Yes; I was fulfilling the duty which devolved upon me by that.

836. Mr. *Lowe.*] You made a decree in this matter?—Yes; recognising the heirs.

837. Have you got that with you?—No; but very likely the other parties have.

838. *Chairman* (to Mr. *Puddick*).] Have you a copy of the consular decree made in respect of this affair of Mr. Woodhouse?—I have the decree itself at home, and I will send a copy to the clerk's office to-morrow; that decree reserved a portion of the property, and hands over a portion to us; it reserved a portion of the money until my wife acquiesced in the document; so far did I consider myself under coercion, that I sent the document that my wife was to sign to see whether the Consulate approved of it, and I thought by that means that a great deal of trouble would be saved; there is my wife's acquiescence in the document. Mr. Saunders retained a portion of the money, that is, my portion of the money, until such a document was sent out from my wife.

839. Does anything turn upon this with reference to what we have been considering to-day?—Yes.

840. Will you be good enough to state what it is?—It is to show that there was coercion, because I was compelled; I found that it was necessary to send a copy of the document, and that it would be necessary for my wife to sign it, and acknowledge the force of the decree; I was not allowed to touch the money until she acknowledged the force of that document; I wrote to Mr. Saunders to ask him if it would do, and if so, to write upon it "approved." He returned it to me, and said it would do, but did not write upon it "approved." I have here a bill of costs.

841. Will you hand it in?—Yes.

[*The same was handed in, as follows*]:

"STATEMENT of Fees payable in the Matter of the Estate of *James Woodhouse*, of Corfu, deceased:

	£.	s.	d.
Declaration of 24th February 1866 -	1	–	–
Registration of death - - - -	–	2	6
Certified copy of declaration aforesaid	–	4	–
Application for administration - -	1	–	–
Declaration of 4th April 1866 - -	1	–	–
Order thereon - - - - - -	1	–	–
2½ per cent. on cash deposited - - } 757 *l.* 17 *s.* 10 *d.* -	18	18	11
£.	23	5	5

"*Sidney Smith Saunders.*"

"British Consulate General,
Corfu, 6 April 1866."

842. Mr. *Egerton.*] You have handed in a paper which appears to be a "Statement of Fees in the Matter of the Estate of James Woodhouse, of Corfu, deceased"?—Yes.

843. The amount is 23 *l.* 5 *s.* 5 *d.*; did you pay that to Mr. Saunders?—Mr. Taylor paid it and charged it to us.

844. (To Mr. *Saunders*). Is that your handwriting (*handing the bill of fees to the Witness*)?—The signature is.

845. Did you make out that bill of fees?—It was made out in the office.

846. Are those the ordinary charges in a similar case?—No doubt of it.

847. Those fees are not, I suppose, payable to you individually?—No, they are paid into the Foreign Office, and accounted for to the Paymaster General.

848. Are those the ordinary charges made for such kind of business?—Yes, decidedly.

849. You have no individual interest in them?—No.

850. Mr *Layard.*] Is it the practice to charge 2½ per cent. on money deposited?—Yes; according to the tariff there, which is sanctioned by the Secretary of State.

851. Do all consuls charge for making a will?—Yes; but it is not called a will, it is called a declaration.

852. Mr. *Egerton.*] Will you be good enough to explain what is the meaning of the word "declaration"?—With regard to the instrument that we call a bequest or a will, the difficulty has been to know what to call it; we called it Mr. Woodhouse's declaration.

853. Mr. *Lowe.*] Was the money charged for preparing that declaration?—Yes.

854. Not for attesting it, but preparing it?—Yes.

855. Where do you get authority to make a charge for preparing documents?—There is in the Consular Office a table showing what the tariff is.

856. For preparing wills?—Yes; and not solely that, but for a great many other things.

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857. This does not appear to be a consul's duty at all?—It is a notarial act.

858. Preparing a will?—Yes.

859. *Chairman.*] I understood you to say that whatever it was, the money went into the Consulate Fund, and not to yourself?—Yes.

860. Have you any remark to make upon the statement of Mr. Puddick, that his having to obtain from his wife an acknowledgment of the force of the decree, was in the nature of coercion?—I do not understand the inference; but the fact is as he states it, that finding he had no power to represent his wife, therefore any act and deed of his could not be considered as a valid act and deed, without having a power of attorney to represent his wife, and that being involved in the matter, he was requested to bring some authority whereby the property to which she would be entitled should be paid over to whomsoever she appointed. He may possibly have sent me the document that was drawn out according to his own fancy, and he may have asked me whether it would do; but if he had asked me to put "approved" upon it, I should have hesitated to do that. Anything that would be considered a sufficient declaration, drawn up in a formal way, would have been sufficient. A document was sent by Mrs. Sarah Puddick, authorising certain acts and deeds, and it was accepted as sufficient (Corr. p. 66).

861. *Chairman.*] You negative all notion of coercion with regard to that document?—Yes, entirely. I cannot understand how coercion could be inferred upon Mrs. Puddick merely by submitting to me a paper, and asking me if it would do, and my simply saying that it would do.

862. Mr. *Lowe.*] Are you not aware that a husband can represent his wife without a power of attorney?—I doubt whether he could execute any notarial acts on her behalf without her authority.

Tuesday, 6th August 1867.

MEMBERS PRESENT:

Mr. Cardwell.
Mr. Edward Egerton.
Mr. Beresford Hope.
Mr. Howes.
Mr. Layard.
Mr. Lowe.
Mr. Arthur Russell.

THE RIGHT HONOURABLE EDWARD CARDWELL, IN THE CHAIR.

JAMES MURRAY, Esq., called in; and Examined.

J. Murray, Esq.

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863. *Chairman.*] WHAT is your position at the Foreign Office?—Assistant Under Secretary of State for Foreign Affairs.

864. I think you have the charge of the Consular Department?—I have the general supervision of it.

865. Will you state to the Committee what you consider to be the duty of the Consul at Corfu in three several cases, namely: 1st, where a British subject dies intestate; 2ndly, where he dies leaving a will and executors; and, 3rdly, where he dies leaving a testamentary disposition, or what purports to be such, operating as to a portion of his property, and leaving him intestate as to the remainder?—I should say in regard to the first case which you put, that the duty of a British Consular officer is clearly laid down in the Convention of London, 4th October 1837 ("Hertslets' Treatise," vol. V. p. 292), wherein it is said "If any British subject shall die in the territories of the King of Greece, or any Greek subject shall die in the territories of the Queen of Great Britain without will or testament, the respective consuls or vice consuls shall exercise the right of administering to the property of subjects of their nation so dying intestate, for the benefit of the legitimate heirs to such property, and of the creditors upon the estate, so far as the laws of the respective countries shall admit." In regard to the second case, I should say that if a British subject dies in the territories of the King of Greece leaving a will or testament, the consular officer has no right of administration, and he should abstain from interference of any sort unless his official action should be required by the executors or heirs or family of the deceased. His interference in such event would depend entirely upon the nature of the application which might be made to him, and how far he might be justified in exerting it. In regard to the third case, I can only express an opinion that where a British subject leaves such a document as Mr. Woodhouse executed or allowed to be executed in his presence, the duty of the consular officer must depend upon the legal effect of the document in question, that is whether it was a testamentary document or only a deed of gift. If it be held to be only a deed of gift, then Mr. Woodhouse, in the absence of any other testamentary document must as regards his general property, be held to have died intestate. In this case it was the duty of the consular officer under the treaty to exercise the right of administration to the intestate property; but in this event his duty was to act for the benefit of the legitimate heirs, and in accordance with local law. Hence in my opinion, it follows that if the document be held to be the last will and testament of the deceased, the duty of the consular officer was simply to receive from the executors or trustees (as they are therein termed) whatever objects they might consider it their duty to make over to him in accordance with the testator's bequest, and to forward those objects to the British Museum. But if the document be held to be only a deed of gift, then immediately on Mr. Woodhouse's death, it was the duty of the consular officer to take possession for the benefit of the heirs, of what must be called the intestate estate of the deceased, and to administer it in accordance with local law. The local law would probably have elicited as to the validity of the deed of gift, and in what manner it was to be acted on.

866. Supposing the document in question to be a valid will, it still purports to deal with a portion of the property only; it would therefore leave a portion of the estate of the deceased unprovided for; would he be, according to the meaning of the Convention, intestate as to that other part, and would the consul therefore have imposed upon him the duty of entering upon administration as to that other part?—It would be his general duty, as a consular officer, to see that a British subject's property was duly taken care of. But in this case, I apprehend it is a question of local law; and if the document be a deed of gift for a certain portion of the property only, or even a will for a certain portion of the property only, there remains still another portion with respect to which the deceased must be held to have died intestate, in which case the duty of the consul was clearly laid down by treaty.

867. Then you hold it to have been the duty of Mr. Saunders, under the Convention, to have entered upon possession of that part of Mr. Woodhouse's property which was not covered by the document?—Certainly.

868. Mr. *Layard.*] Was the Greek law at that time in force in the Island of Corfu?—It was.

869. Mr.

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869. Mr. *Lowe.*] You distinguish between a deed of gift and a will; what difference does it make as regards the duty of the consul, whether the instrument is a deed of gift or a will?—If it is a deed of gift as to the whole of his property, then the consul would have nothing to do with it.

870. You say it is the general duty of a consul to take care of a British subject's property, does not that proposition require some qualification; is it his duty to take care of the property of a British subject who is present, to take care of it himself?—No.

871. Then it is the property of an absent British subject, which it is his duty to take care of?—The property of a British subject.

872. Or the property of an absent British subject, that is to say, when Mr. Woodhouse died, his property became the property of the next of kin?—Then his duty is laid down by the Treaty, viz., to take possession of the intestate's estate for the benefit of the heirs.

873. Supposing one man makes a deed of gift of part of his property, and supposing another man makes a will of part of his property, does the duty of the consul differ in those two cases?—It must depend upon the circumstances of the case entirely.

874. How so?—If the deceased is supposed to have died intestate as to a portion of his property, it is the duty of the consul to take charge of it.

875. Supposing a man has made no will at all, but a deed of gift, he is not intestate as to that?—Not if the deed of gift covers the whole of his property.

876. What difference is there, as regards the duty of the consul, between a case where a man makes a deed of gift as to a part of his property, and a case where a man makes a will as to a part of his property; supposing, in one case, a man has two pieces of property, A and B, and he makes a deed of gift as to A, and says nothing about B; and supposing, in another case, a man has two properties, A and B, and he makes a will as to A, and says nothing about B, is the duty of the consul, on the death of each of those men the same or different?—The duty of the consul would be, in the case of a deed of gift, to take charge of such property as the deed ordered to be made over to him, and hand it over to those entitled under the deed of gift to receive it.

877. I am speaking of property not mentioned in the deed of gift. What would be the duty of the consul with regard to what was not mentioned in the deed of gift?—His duty would be to interfere under the Treaty.

878. What would be his duty in the case of a will?—Not to interfere.

879. Suppose a man died intestate as to a certain portion of his property, what would be the consul's duty?—If he died intestate as regarded a portion of his property, his duty would be to interfere under the treaty.

880. Would it also be his duty to interfere under the Treaty if the man had died, having made a deed of gift only as to a part of his property?—Yes.

881. There is no distinction, then, in the duty of a consul as to his dealing with a part of the property of a deceased British subject not covered by a will, and a part of his property not covered by a deed of gift?—In the one case, what was not covered by the will would be regarded as the property of an intestate, and then the duty of the consul is regulated by the treaty; and, in the other case, what was not covered by the deed of gift would be also regarded as part of the property of an intestate.

882. Then his duty is the same in both cases?—Certainly; as far as regards his duty.

883. Mr. *Layard.*] Do you draw any distinction between a testament and and a *donatio mortis causâ*?—If it related to the whole property, I should draw no distinction.

884. If it related to part, what distinction should you draw?—Then I should say that one part was willed away, and the other was intestate property.

885. That would be the same if the document were a *donatio mortis causâ*?—Yes.

886. Without regard to the consul's duty, as regards the two documents themselves, the one being a will properly executed, and the other being a *donatio mortis causâ*, what distinction do you draw between those two documents themselves?—What I said was, that if the document was held to be a will, then the consul would have nothing to do with it; but if it was held to be a deed of gift of the whole property, I should say that that was equivalent to a will.

887. Mr. *Howes.*] As far as regards the consul's duty?—Yes.

888. Mr. *Egerton.*] You do not intend to put a legal construction yourself upon this document?—Certainly not.

889. You merely state that if the bequest of coins and other antiquities were under a valid will, then the duty of the consul ceased?—Yes.

890. But the other things being left undisposed of, it was the duty of the consul to administer them for the benefit of the next of kin?—Yes.

891. You do not pronounce any opinion whether the document in question is a will or a *donatio mortis causâ*?—On the contrary, I said it was the duty of the consul to administer the effects in accordance with the local law; the local law would probably have laid down what was necessary to be done.

892. You do not take upon yourself to say what the local law in Corfu was?—Certainly not.

893. Mr. *Layard.*] Possibly the local law might make a distinction between a will and a deed of gift?—Yes.

894. *Chairman.*] You mean to say that the duty of the consul was to administer any portion of the property for which the deceased person had not provided, whether by *donatio mortis causâ*, or by will?—Just so.

895. Mr. *Layard.*] If the local law had recognised a will but not a deed of gift, then Mr. Woodhouse would have died intestate with regard to the whole property, and Mr. Saunders would have had to take possession of all the property?—Yes.

896. *Chairman.*] However, the document in question having been prepared by a competent legal adviser, namely by Dr. Zambelli, you do not mean to suggest that there is any doubt of its validity?—I should not like to say whether it is valid or not; I would rather not express any opinion on Greek law.

897. You mean, the duty of the consul was to take care of that portion of Mr. Woodhouse's property, for which he himself had not made proper legal provision?—Certainly.

898. Mr. *Egerton.*] You have known Mr. Saunders a great many years, have you not?—Yes.

899. How

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899. How long have you yourself been connected with the Foreign Office?—Forty-one years.

900. How long during those 41 years have you known Mr. Saunders?—The whole time.

901. Generally, what has been the character which he has borne as a public servant during that time?—His conduct has been always highly approved.

902. Have you any testimonials to that effect?—I desired the Librarian of the Foreign Office to draw out a short statement of Mr. Saunders's services, which, with the permission of the Committee, I will read.

903. That is compiled from the archives of the Foreign Office?—Yes, signed by the sub-librarian.

904. Will you read it?—"Mr. Sidney Smith Saunders was appointed an assistant clerk in the consular department of the Foreign Office on the 5th of July 1826. In consequence of his intelligence and the steadiness with which he performed his duties in the Foreign Office, he was recommended to the Duke of Wellington as a fit person to fill the post of British Consul in Albania, to which office he was appointed on the 24th February 1835. Mr. Saunders served in the above capacity from 1835 to 1859, when he was selected to fill the appointment of British Consul at Alexandria. During his long service in Albania, Mr. Saunders frequently received the approval of the Foreign Office for the able manner in which he performed his duties, more particularly for the service rendered by him in protecting the interests of the Christian population. In 1854, Mr. Saunders was informed by the Foreign Office that 'he had rendered important service' on the occasion of his undertaking a journey in company with a Turkish officer appointed by Fuad Effendi, by which means he had been instrumental in inspiring confidence in the Christian population, and in restraining the excesses of the Mahommedans at a time when every effort was being made by Russia to excite a insurrectionary movement in Albania against the authority of the Sultan. In a further Despatch, Mr. Saunders was informed that Her Majesty's Government entirely approved his proceedings in obtaining the submission of the revolted in several villages, and in urging Fuad Effendi to take measures for relieving the destitute population in the district of Paramethea. During the whole period of the insurrectionary movement in Albania, the conduct of Mr. Saunders was approved by Her Majesty's Government. On the 20th May 1859, Mr. Saunders was appointed Consul at Alexandria, in which position he served until 1864, when he was selected by Her Majesty's Government to be Consul General in the Ionian Islands. During his service in Egypt, Mr. Saunders twice filled the position of acting Consul General, and there is nothing in the correspondence to show but what he performed his duties to the entire satisfaction of the Foreign Office." I, also, have a copy of a Despatch addressed to Lord Russell by Sir Robert Colquhoun, our agent and Consul General in Egypt, in 1864, when Mr. Saunders was promoted to the Ionian Islands,—"My Lord, I have learned with much pleasure from Mr. Saunders that your Lordship had been pleased to recommend him to the Queen as Her Majesty's Consul General in the Ionian Islands. While sincerely congratulating Mr. Saunders on this well-merited advancement, I cannot withhold the expression of my regret at being deprived of the services of so experienced an officer in Her Majesty's consulate at Alexandria. Mr. Saunders carries with him to his new post the esteem and respect of the whole British Colony. For myself I lose in him one to whose judgment I have often had to appeal for information on matters of business, a judgment I have ever found wise and moderate. I understand Mr. Stanley, Her Majesty's Consul at Jeddah, is appointed successor to Mr. Saunders." I may also state from my own knowledge, that Lord Russell, on appointing Mr. Saunders to Corfu was thanked by the Greek Government for making such a good selection.

SIDNEY SMITH SAUNDERS, Esq., called in; and further Examined.

S. S. Saunders, Esq.

905. Mr. *Egerton*.] Do you wish to make any further statement to the Committee?—Yes; perhaps I may be allowed to make some observations on what has passed this morning with reference to the duty of a consul in regard to property covered or not covered by a bequest; I apprehend that it is to be considered that trustees acting under a will (if this bequest is to be considered as such) are seized with the whole of the property of the deceased, mentioned or not mentioned therein; that what is not specificially defined naturally appertains to the heirs-at-law, but that the trustees as executors of the will are seized with the whole of the property: I am advised that that is the view taken by legal gentlemen. That was the view I took of it originally, and I have been informed that it was the correct one. I should submit that it is more a question for high legal advice than for any officer of the Foreign Office, however competent he may be, to be able to pronounce upon such a matter; I do not understand that Mr. Murray does pronounce upon the subject; but I simply submit that it is a question for high legal advice. I would beg to make a supplementary statement, which I have put in writing, with reference to the application of the local law in Corfu, in cases of intestacy which law would come into operation in the event of this bequest being treated as a case of intestacy, "Before the proceedings connected with this inquiry are closed, I would beg to be allowed to offer a few remarks on the application of the Convention between Great Britain and Greece of 4th October 1837, in order to show what would have occurred had the case been treated *in limine* as one of intestacy. The 13th Article of that Convention provides as follows:—It shall be free for the subjects of Her Britannic Majesty residing in the dominions of the King of Greece, and for the subjects of His Majesty the King of Greece residing in the dominions of Her Britannic Majesty, to dispose of their property of every description, by will or testament, as they may judge fit; and if any British subject shall die in the territories of the King of Greece, or any Greek subject shall die in the territories of the Queen of Great Britain, without will or testament, the respective consuls or vice consuls shall exercise the right of administering to the property of subjects of their nation so dying intestate,

J. Murray, Esq.

6 August, 1867.

testate, for the benefit of the legitimate heirs to such property, and of the creditors upon the estate, so far as the laws of the respective countries shall admit. The French version of the text is perhaps even more precise in reference to such cases. It provides that, "Si un sujet Anglais venait à mourir dans les états du Roi de la Grèce, ou si un sujet Grèc venait à mourir dans les états de la Reine de la Grande Bretagne, sans acte de derniere volonté ou sans testament, les consuls ou les vice consuls respectifs auront le droit d'administrer, au profit des héritiers légitimes et des créanciers, autant qu'il sera permis par les lois des pays respectifs, la propriété des sujets de leur nation qui mouraient sans testament." It will thus be seen, that while the right of administering to the property in such cases is conceded to the consular authority, such administration must necessarily be subject to the forms of procedure required by the *lex loci*. Consequently the preparation of an inventory under such circumstances must have been carried out with all the formalities required by that law. The intervention of the local tribunals must therefore have been invoked to this effect, a proceeding manifestly prejudicial to the interests of all parties concerned. What, indeed, would have been said by those who had determined to leave this matter in my hands (*Appendix*, p. 34), as "knowing best how to overcome any local opposition," and under the conviction (*Ibid.*, p. 35), "that should any local difficulty arise as to the exportation," I should "be able to arrange it far better than any stranger sent from England to Corfu to represent the interests of the Museum." Yet the first step to be taken in this affair, under such circumstances, would have been a fatal move in the wrong direction, by throwing the matter into the hands of the local authorities, as the only course calculated to satisfy the requirements and responsibilities so devolving upon me in accordance with the law of the domicile. I need hardly dilate upon the nature of the formalities to be thus complied with; they are set forth in Article 943 of the Code Napoléon (Procedure Civile) upon which the Ionian law then and now in force in such matters (for this has not been abrogated) is founded; suffice it to say, that the character of such proceedings, and of the judicial Acts in connection therewith, would have been least in accordance with the desire entertained (*Appendix*, p. 35), that "action should be taken with the utmost promptitude, and at the same time with as little publicity as possible." The case, therefore, was necessarily treated *ab initio* as that of a British subject disposing of his property *par acte de derniere volonte*, with trustees nominated to this effect. Dr. Zambelli had considered the instrument which he was instructed to prepare as such in designating it a codicil in the first instance (*Corr.*, p. 41), and its dispositions were characterised, in communicating with the heirs, as a basis for letters of administration being granted to the next of kin (*Ibid.*, p. 77). On the other hand, it will be seen by reference to the depositions of one of the servants of the household (*App.*, p. 79), that the local authorities were quite prepared to step in had the opportunity been afforded them, the Procureur du Roi (or Avvocato Fiscale, as there adverted to), having come in person in the first instance to make inquiries in this respect. Such, therefore, was the view taken of the bequest, and the course pursued in unison therewith up to the time of the arrival of the heirs, whose intentions to recognise or dispute the same, remained to be determined in the sequel. Having elected to respect the intentions so expressed, as set forth in their Petition to this effect (*Corr.*, p. 5.), they were thereupon, after the necessary verification of their titles under affidavit, recognised and admitted as administrators to the estate in lieu of the trustees themselves, with special reserve as to the articles already disposed of by the latter, in accordance with the instrument which the heirs had recognised, and with a protective clause on behalf of the wife as regards her portion of the proceeds, to be paid to such person or persons as she might appoint to receive the same. Thus the consulate never took upon itself to administer to the property in accordance with treaty rights, as involving the application of the local law in matters prejudical to the interests of all parties concerned; and I do not know how those interests could have been better provided for in accordance with the intentions of the deceased, and the determination of the heirs-at-law to respect those intentions as expressed in the instrument. Before leaving the matter to the deliberations of the Committee, I would beg to call attention to the note from Mr. Puddick of the 13th August (already presented), as showing that I was in friendly correspondence with the heirs long subsequent to the events referred to, and that it was not of my proceedings, but of the proceedings of others, that they considered themselves entitled to complain. Furthermore, it will have been observed, that the inventory of the articles sent to the British Museum was avowedly seen by the heirs in the hands of Mr. Taylor, who alone could exhibit the same, the original draft being in his possession. Moreover, as I have already explained (*Correspondence*, pp. 76, 77), the consignment of such inventory for transmission to the British Museum, considered as the formal act of delivery on the part of the trustees of the deceased, was carried into effect with the sanction and approval of the heirs themselves. I would also beg to advert to the alleged assistance afforded to Mr. Taylor in wording his answers (Minutes of Evidence, 109), which answers, however, were accepted as Mr. Taylor's, and put down as such (*Ibid.* 117); the fact being that, sitting in a magisterial capacity, I considered myself not only entitled, but in duty bound, to clear up any ambigious matters by additional questions, acting in conjunction with Mr. Newton himself. I conceive that these additional explanations will fully serve to satisfy the Committee and the Trustees of the British Museum as therein represented, that my action in this matter has been irreproachable from first to last; and I cannot but feel confident that a just appreciation of all the circumstances will not only serve to exonerate me from any kind of imputation in this respect, but that the conscious conviction will have been established, and reign paramount in the minds of those to whom this inquiry has been entrusted, that ample reparation is due to me on this occasion for the unenviable requital hitherto experienced.

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APPENDIX.

Appendix, No. 1.

GOLD ORNAMENTS in Mr. WOODHOUSE'S MUSEUM.

App. No. 1.

1.—PAIR of earrings, the pendant of one a naked male figure; of the other, a naked female figure; the female figure wore a wreath of filagree. The pendants about $3\frac{6}{8}$ in. long by $1\frac{6}{8}$ in. wide. (Appendix, p. 85, No. 1.)

2.—Pair of earrings with doves as pendants, the doves made of filagree. (Ibid, No. 2.)

3.—Pair of earrings, the pendants in the form of a bell. (Ibid, No. 3.)

4.—Pair of earrings, the pendants in the form of a male and female figure. (Ibid, No. 4.)

5.—Pair of earrings, pendant a flower, rather more than 1 in. long. (Ibid, No. 6.)

6.—Pair of earrings, pendants flowers in filagree, and dogs' faces. (Ibid, No. 14.)

7.—Pair of earrings, bull's heads, thick, without filagree. (Ibid, No. 16.)

8.—Pair of earrings, winged figures embossed on plates, plain at the back. (Ibid, No. 18.)

9.—Pair of earrings, dogs' heads, with filagree. (Ibid, No. 19.)

10.—About a hatful of leaves for wreaths. (Ibid, p. 88, No. 5.)

11.—String of filagree about the thickness of small twine, with 26 olive leaves set in it. The leaves were of thin gold, made in pairs. (Ibid, p. 88, No. 8.)

12.—Wreath in fine condition, not a leaf wanting. (Ibid, No. 9.)

13, 14.—Two boars, of solid gold, with bridles in their mouths and projecting teeth, the tails turned round on their backs. (Ibid, No. 2.)

15.—Bronze horse, with a silver foot. (Ibid, p. 91, No. 28.)

I remember quite well seeing all the objects mentioned above, when Mr. Woodhouse showed me his collection at Corfu, in June 1863.

20 July 1867. *Emily A. Strangford.*

Appendix, No. 2.

WOODHOUSE COLLECTION.

COPY of the CONSUL GENERAL'S DECREE to the HEIRS.

App. No. 2.

WHEREAS by a solemn declaration made at this office on the fourth day of this month, in accordance with the provisions of the Act 5 & 6 Will. 4, c. 62, by James Woodhouse, of No. 46, Burlington-road, London, gentleman, and John Edward Puddick, of No. 22, Westbourne Park-terrace, London, gentleman, it has been shown to our satisfaction that the said James Woodhouse is the only son of the late Henry Cooper Woodhouse, deceased, the only brother of the late James Woodhouse, of Corfu, deceased; and that the latter had only one sister, who died unmarried; and that the said John Edward Puddick is the husband of Sarah Woodhouse, the only daughter of the said Henry Cooper Woodhouse; and that the said James Woodhouse, of Corfu, was never married, and has no other next of kin, to the best of their knowledge and belief; and that after minute inquiry and research, they, the said James Woodhouse, of London, aforesaid, and John Edward Puddick, do verily and truly declare and believe that the said James Woodhouse, of Corfu, died intestate. And whereas they, the said James Woodhouse, of London, and John Edward Puddick, of London, aforesaid, do jointly and severally engage to hold themselves responsible to all other claimants in this respect, and to discharge all just debts, of whatsoever nature, which may duly be substantiated against the estate of the said James Woodhouse, of Corfu, aforesaid, so far as the proceeds thereof permit; and, furthermore, declare that the said proceeds are under the sum of Three thousand pounds sterling.

Now we, Sidney Smith Saunders, Her Britannic Majesty's Consul General in the Ionian Islands, do hereby recognise and admit the said James Woodhouse, of No. 46, Burlington-road, London, and Sarah Puddick, of No. 22, Westbourne Park-terrace, London, to administer to the estate of the said James Woodhouse, of Corfu, deceased, in so far as the property of the latter is within our jurisdiction and control, and to receive all monies, goods, chattels, and other articles appertaining to the said estate, save and *accept those already disposed of, in accordance with a certain declaration in writing, made under the hand of the deceased James Woodhouse, bearing date the Twenty-fourth day February last, and duly recognised by said James Woodhouse, of London, and John Edward Puddick, of London, aforesaid. And, furthermore, we hereby order that the portion appertaining to the said Sarah Puddick of the proceeds of the estate of James Woodhouse, of Corfu, deceased, and of all monies appertaining to the said estate, do remain under the custody of this consulate general until the said Sarah Puddick shall have duly signified her approval in writing of all acts and deeds done or executed on her behalf in these premises by her husband John Edward Puddick aforesaid, and shall have authorised some person or persons to act on her behalf, and to receive such sums of money and other property as may rightfully appertain to her in virtue of these presents. And, furthermore, we hereby order and direct that after payment to this office of the sum of Twenty-three pounds five shillings and five pence, according to the detailed statement hereunto annexed, one moiety of the sums found in cash at the residence of the deceased, and paid into the hands of Mr. James William Taylor, of Corfu, Banker, be forthwith paid unto the said James Woodhouse, of London, aforesaid, and that the other moiety thereof be held at the disposal of the said Sarah Puddick, so soon as she shall have duly conformed to the terms hereinbefore prescribed, and under our sanction and approval to this effect. In testimony thereof we hereunto set our hand and seal of office at Corfu, this sixth day of April, in the year of our Lord One thousand eight hundred and sixty-six.

* (*Sic.*)

(signed) *Sidney Smith Saunders*, Consul General.

(Stamp.)

A true Copy made by

31 July 1867. *J. E. Puddick*, 22, Westbourne Park-terrace, W.

REPORT

FROM THE

SELECT COMMITTEE

ON THE

WOODHOUSE COLLECTION

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

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